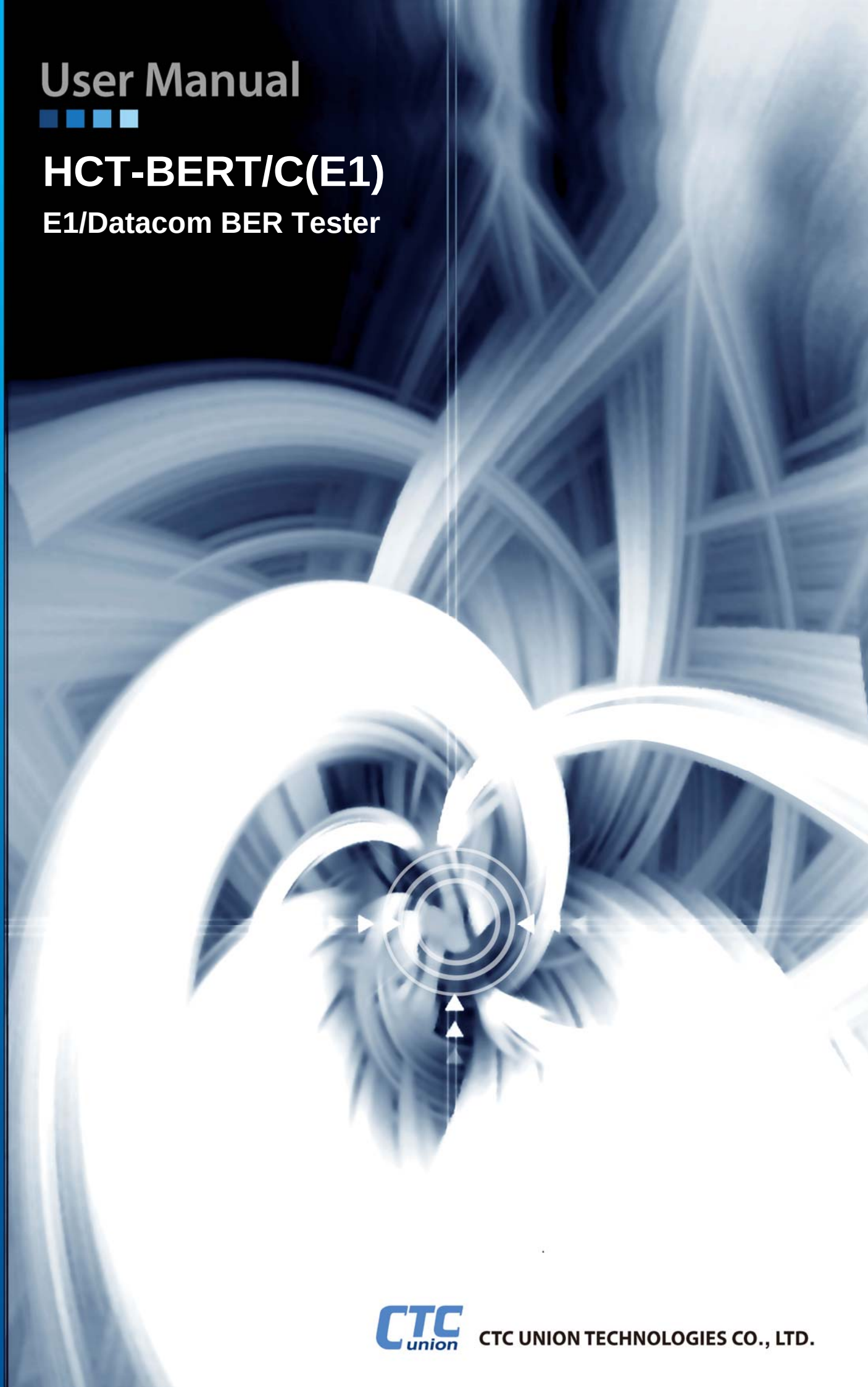
User Manual

HCT-BERT/C(E1)

E1/Datacom BER Tester



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MHCT-BERT/C

E1 / Data Communications Bit Error Rate Tester

User Manual
Version 1.2 December 2010

This manual supports the following models:
HCT-BERT/C
HCT-BERT/E1

Note: Model HCT-BERT/E1 supports E1 testing only (no Data Communications).

This document is the current official release manual. Please check CTC Union's website for any updated manual or contact us by E-mail at info@ctcu.com. Please address any comments for improving this manual or to point out omissions or errors to marketing@ctcu.com. Thank you.

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Chapter 1 HCT-BERT/C(E1) Overview

1.1 Introduction

HCT-BERT/C(E1), a hand-held E1 data error-testing instrument with a true-color screen and graphic and full-Chinese operating interface is used in field maintenance and analysis of E1/G.703 line and error test of data communicationg (V.35, V.24/RS232, RS449, RS530, X.21) (Only HCT-BERT/C support). It features all-around functions and convenient operations, and can analyze & display test results in conformity with international standard such as G.821, G.826 and M.2100 and be able to store and carry out a statistics & analysis on data results according to the requirements of users as well, and is ideal tool in line quality measurement.

1.2 Function

- True-color screen, graphic & full English/Chinese operating interface
- More than one type of E1 error analysis, including E1 frame, pattern, CRC and BPV analysis
- Error performance analysis (G.821, G.826, M.2100)
- E1 signal frequency offset test
- Setup of various time slots of E1 line available (FAS, CAS)
- Diversion & insertion of time slots in E1 channel (N × 64Kdata) available.
- ABCD bit setting and display of CAS signaling.
- Sa bit setup and display of 0 time slot.
- Error test of data port (interface mode: V.35, V.24/RS232, RS449, RS530, X.21).
- OOS (Out-of-Service) & ISM (In-Service-Measurement) error performance analysis.
- Storage of 100 config & test result documents available, which user can store or call out.
- Visual display in histogram.
- More than one output modes of test results: internal storage result, LCD screen display, and LPT print.
- Embedded large-capacity rechargeable lithium battery, portable for field use.

1.3 Overall Functions and Specifications

1.3.1 E1 Specifications:

1). E1 Receiving Interface

- Line code: HDB3/AMI
- Pulse characteristics: in conformity with ITU G.703
- Jitter tolerance: in conformity with ITU G.823
- Input port Type:
  Coaxial twin: BNC (non-balance)
  Symmetrical twin: RJ45 (balance)
- Input mode:
  Terminal mode:
  Coaxial Pair Impendance: 75ohm (unbalanced)
  Symmetrical Pair Impendance: 120ohm (balanced)
  Bridging mode:
  Impedance: > 1000 ohm

2). E1 Transmission Interface

- Line code: HDB3/AMI
- Pulse characteristics: in conformity with ITU G.703
- Pulse amplitude: Nominal value of 2.37V for 75ohm of coaxial pair
  Nominal value of 3.00V for 120 ohm of symmetrical pair
- Zero amplitude: ± 0.1 V at max
- Jitter tolerance: in conformity with ITU G.823
- Output port model:
  Coaxial Pair: BNC (non-balance)
  Symmetrical Pair: RJ45 (balance)
- Source of clock transmission:
  Internal Timing: 2.048 MHz ±50ppm, ±100ppm.
  External Timing: take clock from external clock interface
  Recovery Timing: take clock from receiving terminal

3). E1 Frame Format

- PCM31
- PCM31+CRC
- PCM30
- PCM30+CRC
- Unframed
- Automatic detection

1.3.2 Error Rate Test (BERT Test):

1). BERT Pattern (Patterns)

511, 2047, 2E15-1, 2E15-1 (reverse), 2E20-1, 2E20-1 (reverse), QRSS, 2E23-1, 2E23-1 (reverse), all 1, all 0, alternate, 1100, 3 IN 24, 1 IN 16, 1 IN 8, 1 IN 4, User Programmble1, 2, 3, LIVE

2). BERT Display Format

- Error counting
- Alarm counting
- ITU G.821
- ITU G.826
- M.2100
- Histogram

3). BERT Transmission Error Rate

- Force Single Error
- Force 10^{-3}-10^{-7} Error Rate

4). Quality Analysis:

- Receiving seconds
- Error seconds
- Alarm seconds
- Error Free seconds
- Error rate
- Available seconds
- Serious error seconds
- G.821 error seconds
- G.826 error seconds
- Unavailable seconds

5). Data Port BERT Test (Only HCT-BERT/C support)

- Data rate of the multiple of 64Kbps: N*64Kbps (N=1~36)

1.3.3 Other Functions:

1). Color Display Screen

- Character/graphic mode

2). Test Results Report

- 100 pieces of test results at max available in storage
- Direct display on LCD screen
- Print via printer port available

3). Portable for Field Use

4). Modular Design for Easy Update

5). Battery Supply: 4 hours
6). Temperature Range: 0 °C-50 °C (operating temperature)
-20 °C-60 °C (storage temperature)
7). Humidity: up to 95% without condensing
8). Power supply source: AC-230V / DC9V/2000mA power Switch Adapter
9). Dimensions
178.5mm (L) × 133.5 mm (L) × 68 mm (H)
10). Weight
Less than 0.8kg (net weight)

1.3.4 Interface profile:

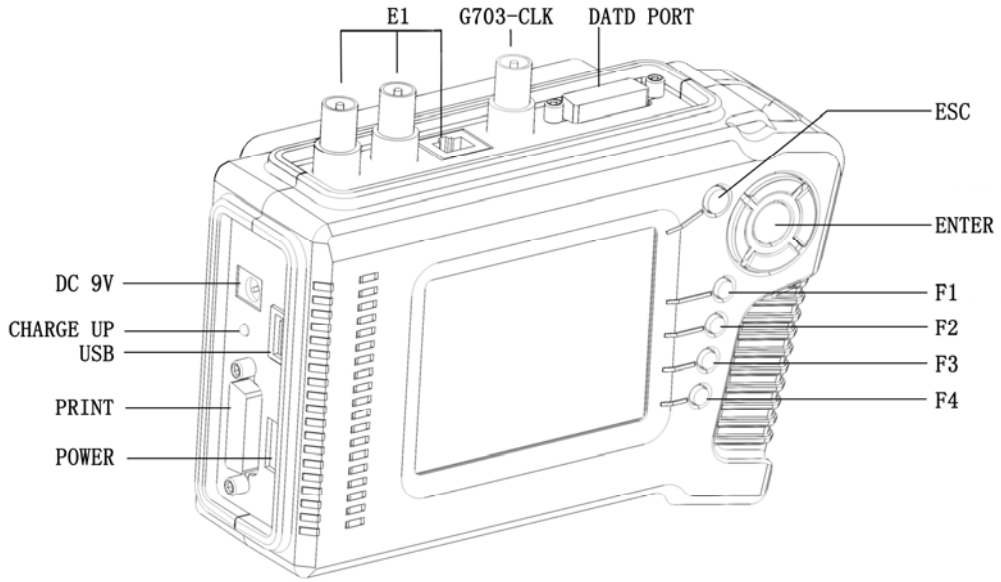


Figure 1-1 HCT-BERT/C(E1) Profile(HCT-BERT/E1 NO Data port)

- BNC * 2: E1 transmission and receiving (Unbalanced)
- BNC: External clock
- RJ45: E1 transmission and receiving (balanced)
- HDB26 (female socket): data port (RS232/V.24, V.35, V.36, X.21, RS-449, EIA-530 interface)
- HDB26 (female socket): printer port
- USB: communication port between instrument and PC
- Power switch: power on/off
- Power socket: DC-9V

1.4 LED Status Display

HCT-BERT/C LED is on the left side of front panel and displays as follows:

Digital signal		E1 signal	
Name	**Color**	**Color**	**Name**
DTE	GREEN		
DCE	GREEN		
DATA PORT	GREEN		
		GREEN	Terminal
		GREEN	Bridge
		GREEN	E1
TD	GREEN	RED	LOS
RD	GREEN	RED	AIS
DCD	GREEN	RED	LOF
RTS	GREEN	RED	LOMF
CTS	GREEN	RED	LOCRC
DTR	GREEN	RED	RAI
DSR	GREEN	RED	MRAI
TC	GREEN	RED	LOP
RC	GREEN	RED	CODE ERR
XTC	GREEN	RED	FAS ERR
BIT ERR	RED	RED	BIT ERR
LOP	RED	RED	CRC ERR
		RED	E BIT ERR

HCT-BERT/E1 LED is on the left side of front panel and displays as follows:

E1 signal	
Color	**Name**
GREEN	Terminal
GREEN	Bridge
GREEN	E1
RED	LOS
RED	AIS
RED	LOF
RED	LOMF
RED	LOCRC
RED	RAI
RED	MRAI
RED	LOP
RED	CODE ERR
RED	FAS ERR
RED	BIT ERR
RED	CRC ERR
RED	E BIT ERR

Details of LED indicators are as follows:

1) Digital Signal Display

DTE:
Green LED means that the data port currently works in DTE mode.
DCE:
Green LED means that the data port currently works in DCE mode.
DATA PORT:
When data port is currently engaged, LED displays green.
TD:
Green LED means some data is under transmission.
RD:
Green LED means some data is being received.
DCD:
Green LED means Data Carrier Detect.
RTS:
Green LED means Request to send.
CTS:
Green LED means Clear to send.
DTR:
Green LED means Data terminal ready.
DSR:
Green LED means Data set ready.
TC:
Green LED means Transmit Clock.
RC:
Green LED means Receive clock.
XTC:
Green LED means DTE Transmit clock.
BIT ERR:
Red LED means bit error detected during the test of testing pattern.
LOP:
Red LED means Loss of Pattern synchronization.

2) E1 Signal Display

Terminal (terminal mode):
Green LED means that HCT-BERT/C E1 reception is set up in terminal mode and the impedance may be E1 75 ohm or E1 120ohm.
Bridge (bridging mode):
Green LED means that HCT-BERT/C E1 reception is set up in high-impedance bridging mode.

E1:

Green LED means that HCT-BERT/C works in E1 test mode.

LOS: (Loss of Signal):

Red LED means that the signal received via E1 receiving port is too weak and is equal to or less than 35db, with detection time: 10≤code element quantity ≤255.

AIS: (Receive Alarm Indication Signal, all are the frame of 1)

Red LED means that there is some criteria in ITU G.775 detected and released by RAIS. In E1 mode, in case that there are two consecutive twin frames (500us), each 512 bit contains two or less than two 0 and moreover, FAS alignment doesn't exist, the light will turn on; and release condition of RAIS is that in two consecutive twin frames (500us), 512 bit contains three or more 0 received, or FAS alignment resumes.

LOF:

Red LED means Loss of Frame Alignment

LOMF:

Red LED means Loss of CAS multi-frame alignment

LOCRC:

Red LED means Loss of CRC-4 multi-frame alignment

RAI: (Receive Remote Alarm Indication)

Red LED means that in E1 mode, if in two consecutive NFAS, TS0 bit 3=1, the light will turn on; and if in two consecutive NFAS frames, TS0 bit 3=0, the light will turn off.

MRAI:

Red LED means Multi-frame Remote Alarm Indication

Multi-frame remote-end alarm indication

LOP:

Red LED means Loss of Pattern synchronization

CODE ERR:

Red LED means HDB3 code alternation-polarity error. We can find out breakdown point firstly and check if the polarity of breakdown point is altered. In case of no alternation, coding error should be confirmed.

FAS ERR:

Red LED means error in frame alignment signal (0011011)

BIT ERR:

Red LED means bit error detected in the test of testing pattern.

CRC ERR:

Red LED means that CRC-4 error is calculated

E-BIT ERR:

Red LED means that CRC-4 error occurs to remote and is indicated with E bit.

1.5 Interface Panel

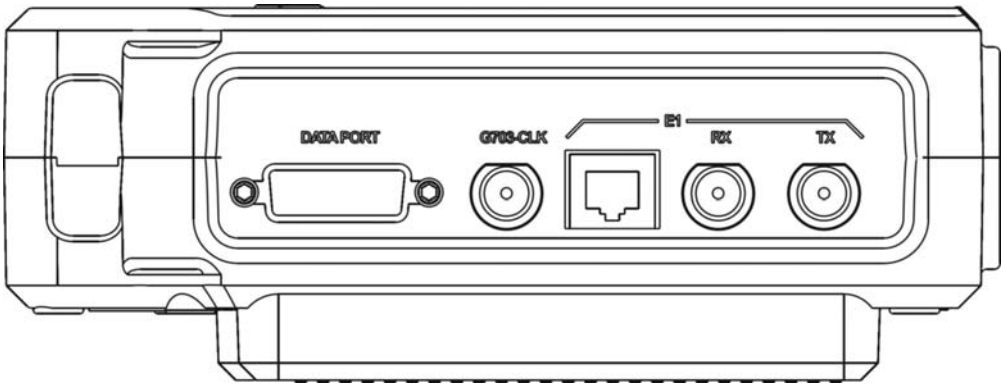


Figure 1-2 Front Panel of HCT-BERT/C(E1)(HCT-BERT/E1 NO Data port)

Description:

TX (BNC):
Unbalance transmission port of E1, and BNC Type
RX (BNC):
Unbalance receiving port of E1, BNC Type

RJ45:
Balance interface of E1 for transmission (TX) and receiving (RX)
G703-CLK (external clock):
Input interface of reference clock of external E1

DATA PORT:

Data port can be set up as RS232/V.24, V.35, V.36, X.21, RS-449 and EIA-530 communication ports. Accessory connecting cables of the device can be used for testing data port.

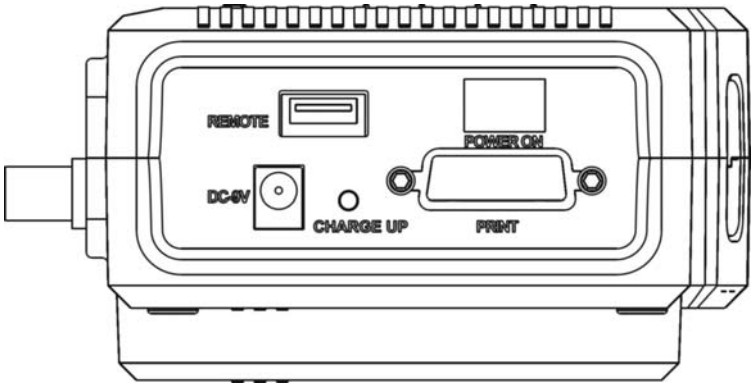


Figure 1-3 Side Panel of HCT-BERT/C(E1)

Description:

POWER ON:
Switch of power supply

REMOTE:
It is a communication port between instrument and PC (USB interface). The user can configure the instrument or update its software in adoption of PC via USB interface.

DC-9V:
When external power adapter (DC9V/2A adapter) is used, insert the adapter into the socket for power supply. In case of inadequate electric energy of battery, please use external power adapter for charging.

CHARGE UP:
It is indicator light of charging. When external power adapter is inserted, LED turn-on means charging goes on and turn-off means adequate electric energy of the battery.

Printer (printer):
If accessory printer cable of the device is used, it can be connected to average printer port.

Chapter 2 E1 Test

2.1 Parameter Setup

When HCT-BERT/C(E1) is at the main menu, press ⇦,⇨ cursor keys to select “E1 Analyzer”. The interface displays various configurations as in Figure 2-1:

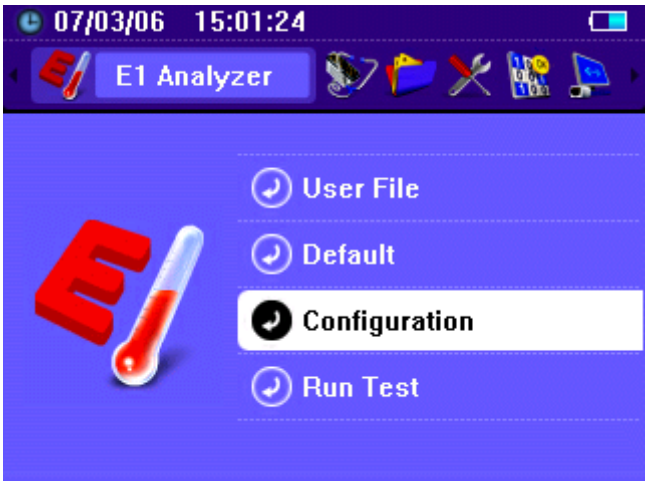


Figure 2-1 Configuration Setup Interface of E1 Analyzer

Four items i.e. ” User File, ”Default “, “Configuration and ” Run Test “ are included, with meanings as follows:

User File: call a parameter setup file pre-stored in the instrument as in Figure 2-2. The user can move the cursor by ⇧, ⇩ keys and select different parameter setup files by ◯ key.

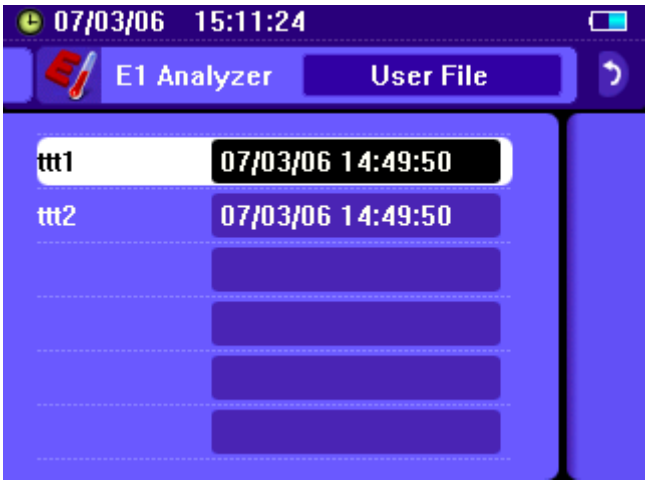


Figure 2-2 User File Interface of E1 Test

Default: set up all parameters in E1 test as default values, and enter ”Parameter setup“ interface rapidly to confirm if default setup parameters are in conformity with test requirements or modify accordingly.

Configuration: enter ” Configuration interface as in Figure 2-3.

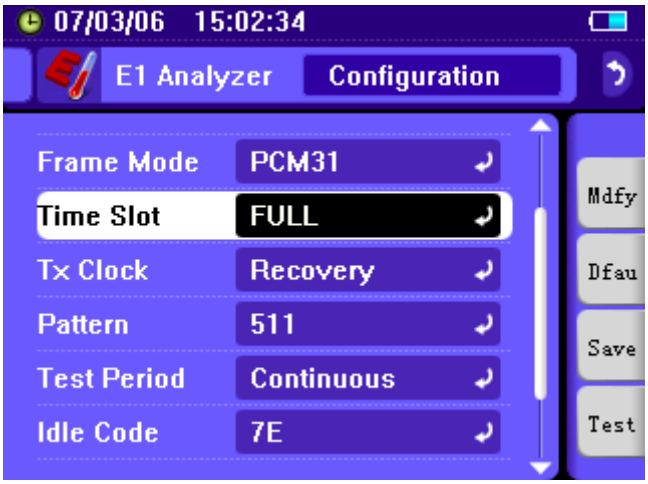


Figure 2-3 Configuration Interface of E1 Test

There are parameters available for setup in the interface. Move the cursor by ⇧, ⇩ keys, and select relevant items by ◯ key. Popup dialog box will list out the options for a parameter as in Figure 2-4.

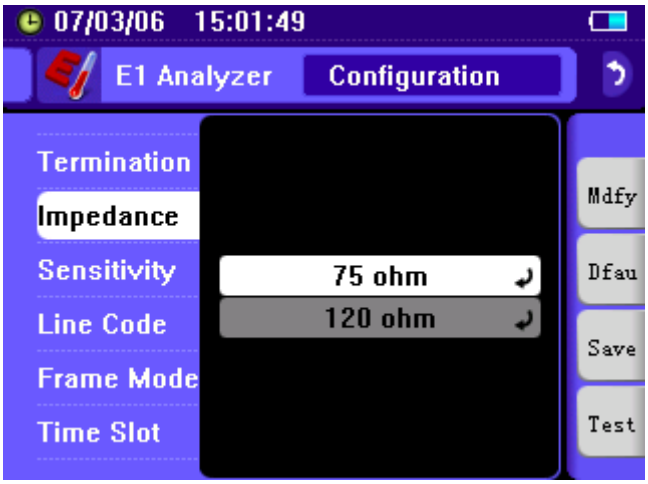


Figure 2-4 Parameter Value Selection Interface of E1 Test

In the interface of Figure 2-4, move the cursor by ⇧, ⇩ keys to select different parameter options, and use ◯ key to confirm. For the meaning of each parameter, please refer to “2.2 Parameter Explanations”.

Run test: select the instrument, and enter test status. Various parameter values of the instrument are the options set up last time.

The above is the setup for E1 test of HCT-BERT/C(E1). On the right side of ” Configuration interface (Figure 2-3), there are four function keys i.e. ” Mdfy, ”Default “, ”Save “ and ”Test“, which correspond with F1, F2, F3 and F4 keys. Press relevant keys to call corresponding functions rapidly.

Save: in ” Configuration interface, press F3 key, and select ”Save “ function to save up current parameter setup in a file. In later operation, use Mdfy function to call corresponding parameter setup as in Figure 2-2. Select ”Save “ function interface as in Figure 2-5.

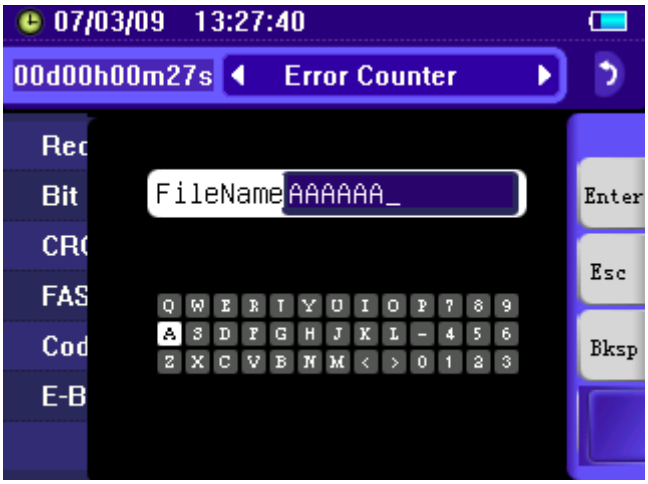


Figure 2-5 Parameter Setup Saving Interface of E1 Test

Move the cursor by ⇦, ⇨, ⇧ & ⇩ keys to the letter or digit in demand, and press the key of letter or digit as file name. ” Enter, ” Ecs & “Backspace” keys on the right side correspond with F1, F2 & F3 keys respectively.

2.2 Parameter Explanations

Valid parameter setups of **HCT-BERT/C(E1)** and meanings are as follows:

Parameter	Option	Description
Connection Type	Terminal	Set up HCT-BERT/C(E1) transmitting and receiving ports in E1 terminal mode.
	Bridge	Set up **HCT-BERT/C(E1)** in E1 bridge mode. Receiving terminal impedance ≥1Kohm .
Impedance	75ohm	Set up **HCT-BERT/C(E1)**port impedance as 75ohm.
	120ohm	Set up **HCT-BERT/C(E1)** port impedance as 120ohm.
Sensibility	High	Set up the highest receiving sensibility
	Low	Set up the lowest receiving sensibility
Code	HDB3	Set up line coding mode as HDB3.
	AMI	Set up line coding mode as AMI.
Framing	PCM31	PCM31 mode. When time slot is set up as FULL, all FAS+ time slots from TS1-TS31 are set up as being engaged; When time slot is set up as N*64, time slot is TS that FAS+ sets up as being engaged (other TS set up as being idle). Note: TS: time slot
	PCM30	PCM30 mode. When time slot is set up as FULL, the FAS+CAS+time slots including TS1-TS15 and TS17-TS31 all are set up being engaged; When time slot is set up as N*64, FAS+CAS+TS are set up as being engaged (other TS set up being idle).
	PCM31+CRC	PCM31 mode, CRC4 start-up. When time slot is set up as FULL, FAS time slot TS1-TS31 all are set up being engaged; When time slot is set up as N*64 时, time slot is TS that FAS+ sets up being engaged (other TS being idle).

	PCM30+CRC	PCM30 mode, CRC4 start-up. When time slot is set up as FULL, FAS+CAS+time slot TS1-TS15 and TS17-TS31 all are set up being engaged; When time slot is set up as N*64, FAS+CAS+ sets up as engaged TS (other TS being idle).
	Non-framing	Non-framing mode. TS0-TS31 all are set up being engaged.
	Automatic detection	Automatic detection mode. HCT-BERT/C will automatically identify framing model of E1 interface of terminal according to the status of current line.
Time slot setup	Full	Select according to framing model, and set up all time slots available as being engaged (see ”framing model” description).
	N*64	Select a time slot available, and set up as being engaged or idle (see ”framing model” description). For detailed setup, please refer to 3.3 Time Slot Setup.
Transmit clock	Recovery clock	Transmit clock, and take the clock from E1/T1 receiving port (Recovery), and use it as reference clock.
	Internal clock	Transmit clock, and take the frequency produced by internal quartz vibrator of **HCT-BERT/C(E1)** i.e. 2048K bps.
	External clock	Transmit clock, and take clock input via external (reference clock) port of **HCT-BERT/C(E1)**, and use as reference clock.
	50ppm	Transmit clock, and take the frequency produced by internal quartz vibrator of **HCT-BERT/C(E1)** plus a deviant of 50ppm, and use as reference clock.
	100ppm	Transmit clock, and take the frequency produced by internal quartz vibrator of **HCT-BERT/C(E1)** plus a deviant of 100ppm, and use as reference clock.
	-50ppm	Transmit clock, and take the frequency produced by internal quartz vibrator of **HCT-BERT/C(E1)** plus a deviant of -50ppm, and use as reference clock.
	-100ppm	Transmit clock, and take the frequency produced by internal quartz vibrator of **HCT-BERT/C(E1)** plus a deviant of -100ppm, and use as reference clock.
Test pattern	511	Pseudo-random sequence pattern: 2E9-1 (O.153)
	2047	Pseudo-random sequence pattern: 2E11-1 (O.152 and O.153)
	2E15-1	Pseudo-random sequence pattern: 2E15-1 (O.151)
	2E15-1 (reverse)	Pseudo-random sequence pattern: 2E15-1 (O.151 reverse)
	2E20-1	Pseudo-random sequence pattern: 2E20-1 (O.153)
	2E20-1 (reverse)	Pseudo-random sequence pattern: 2E20-1 reverse)
	QRSS	Pseudo-random sequence pattern: 2E20-1 (O.151 QRSS)
	2E23-1	Pseudo-random sequence pattern: 2E23-1 (O.151)
	2E23-1 (reverse)	Pseudo-random sequence pattern: 2E23-1 (O.151 reverse)
	All 1	Repetitive pattern: all 1 (11111...)

	All 0	Repetitive pattern: all 0 (00000...)
	Alternate	Repetitive pattern: alternate 1 & 0 (10101010...)
	1100	Repetitive pattern: all 1100
	3 IN 24	Repetitive pattern: 3 ”1” in 24 bits
	1 IN 16	Repetitive pattern: 1 ”1” in 16 bits
	1 IN 8	Repetitive pattern: 1 ”1” in 8 bits
	1 IN 4	Repetitive pattern: 1 ”1” in 4 bits
	User pattern 1	User programmable pattern 1 with pattern length of 1-32 bit. For detailed setup, please refer to 5.4 User Programmable Test Pattern.
	User pattern 2	User programmable pattern 2 with pattern length of 1-32 bit. For detailed setup, please refer to 5.4 User Programmable Test Pattern.
	User pattern 3	User programmable pattern 3 with pattern length of 1-32 bit. For detailed setup, please refer to 5.4 User Programmable Test Pattern.
Test time	Consecutive	Execute BERT test all the time
	15 minutes	Execute BERT test for 15 minutes
	30 minutes	Execute BERT test for 30 minutes
	1 hour	Execute BERT test for one hour
	24 hours	Execute BERT test for one day
Idle code	7E	The time slot preset as idle will be filled with a hexadecimal 0x7E code during the time slot transmitted.
	7F	The time slot preset as idle will be filled with a hexadecimal 0x7E code during the time slot transmitted.
	Pass	If the clock transmission is set up as ”recovery clock“, the data received by idle time slot will be used as ”idle code” and be transmitted via the time slot again.

After the parameter is set up, carry out ”test“ function. The instrument will run E1 error analysis function. For detailed operations, see Chapter 6 Error Analysis Function.

2.3 Time Slot Setup

When a time slot of HCT-BERT/C(E1) is set up as N*64 as in Figure 2-6, enter time slot setup interface as in Figure 2-7.

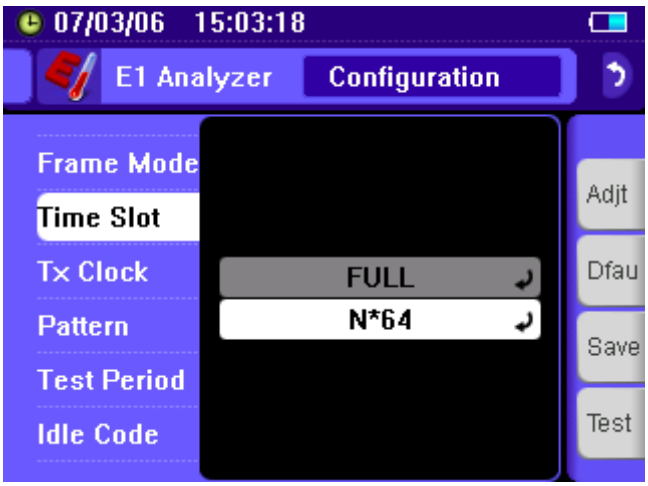


Figure 2-6 Time Slot Setup Interface

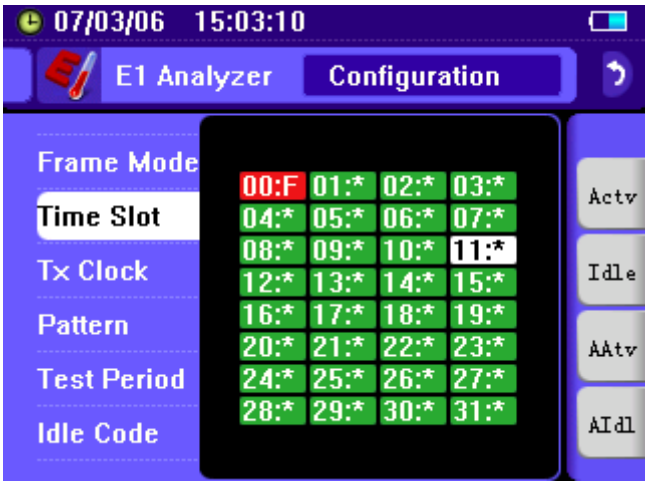


Figure 2-7 N*64 Mode Time Slot Setup Interface

In case of framing type of PCM31 or PCM31+CRC, 31 time slots (time slot 1-31) can be set up. In case of framing type of PCM30 or PCM30+CRC, 30 time slots (time slot 1-15, and time slot 17-31) can be set up. In case of framing type of Unframe all 32 time slots (time slot 0-31) can be set up as engaged.

In Figure 2-7 N*64 Mode Time Slot Setup Interface, there are 32 digits and symbols such as ”*” & “-” on the screen, of which each symbol represents current setup status of one time slot as follows:

* The time slot is set up as being engaged and can be loaded with data transmission and receiving.

\- The time slot is set up as being idle, and can transmit idle code via the transmission part.

F The time slot cannot be set up.

Moreover, small check that each represents one time slot displays current status with color.

Red: the time slot cannot be set up.

Green: the time slot is set up as being engaged.

Black: the time slot is set up as being idle.

White: the position of time slot where current cursor stays.

In time slot figure, white small check represents the time slot where the current cursor stays. Press "⇧", "⇩", "⇦" or "⇨" key to move the cursor. Function keys including "Active, "Idle", "All Active & "All idle" on the right side correspond with F1, F2, F3 & F4 respectively. The function keys can change the setup of time slot where current cursor stays, or use/not use all time slots.

Detailed meaning and action of various function keys are as follows:

[F1] Active Set up the time slot as being engaged.

[F2] Idle Set up the time slot as being idle.

[F3] All Active Set up all time slots as being engaged.

[F4] All idle Set up all time slots as being idle.

After the status of time slot is changed, use ◯ key for confirming.

2.4 User Programmable Test Pattern

If HCT-BERT/C(E1) stays in the main menu, press ⇦ & ⇨ keys of the cursor to select "Advanced options". The menu will display advanced configurations for selection as in Figure 2-8:

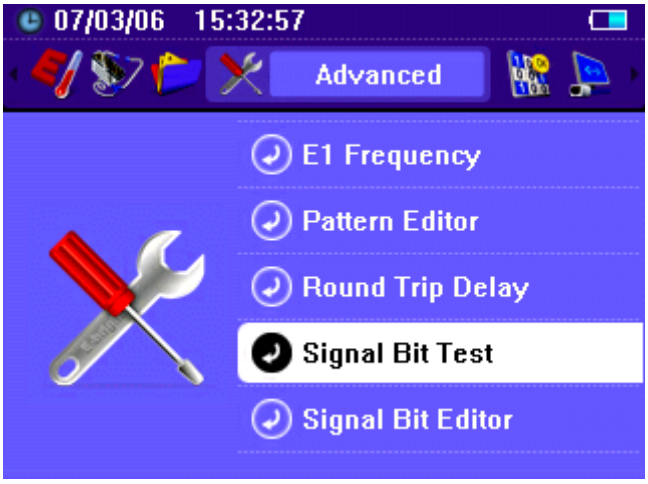


Figure 2-8 Advanced Options Setup Interface

Use ⇧ & ⇩ keys to move the cursor to "Pattern Editor, and press ◯ key to enter the editing interface of user test pattern as in Figure 2-9.

For error test analysis, three user-programming patterns can be set up.

The repetitive character length in user programmable test pattern is 32 bits. The length of current test pattern displays on each user test pattern.

07/03/08 10:30:35
Advanced
Pattern Editor
User Prog#1 Leng: 08
1 1 1 1 0 0 0 0 - - - - - - - -
- - - - - - - - - - - - - - - -
User Prog#2 Leng: 08
1 1 1 1 0 0 0 0 - - - - - - - -
- - - - - - - - - - - - - - - -
User Prog#3 Leng: 08
1 1 1 1 0 0 0 0 - - - - - - - -
- - - - - - - - - - - - - - - -
1
0
—
Save

Figure 2-9 User Test Pattern Editing Interface

The function key “1”, ”0”, “-” and ”Save“ on the right side correspond with the key F1, F2, F3 & F4 respectively. The explanation of each function key is as follows:

[F1] 1 Set up the bit as ”1”.

[F2] 0 Set up the bit as ”0”.

[F3] - Delete the bit. When the cursor stays on the final bit of the character, press ”-” key to delete the whole bit and cut off the length of the whole character by 1 accordingly.

[F4] Save Save up current user pattern setup.

Chapter 3 Result Analysis

3.1 Introduction

When HCT-BERT/C(E1) is at the main menu, select “Start test” to enter BERT test and analysis, or press F4 key in the menu interface of ”Parameter setup“ and enter the test.

Once the function starts, it will immediately execute the real-time mode of quality analysis of E1 line, including errors counting, alarm seconds counting, 821 analysis, G.826 analysis, M.2100 analysis, alarm-time chart and error-time histogram analysis. Moreover, error insertion operation is available. Execute a test according to “Test time” in “Parameter“. Once ”15 minutes“, ”30 minutes”, ”1 hour” or ”24 hours” is selected, the test will automatically stop after the time is over; and once ”Consecutive” is selected, press F4 Stop to stop the test.

When a test is executed, the interface displays as in Figure 3-1:

Figure 3-1 Error Counting Interface

There is a display of execution time on left upper corner of the interface after the test starts. **d**h**m**s means **day**hour**minute**second that the test has spent.

Error counting, alarm second counting, G.821 & G.826 analyses, M.2100 analysis, alarm indicator diagram or error histogram display on the right upper corner, and indicate the analysis display mode of the instrument at present.

” Undo, “Save/Printer”,”Error insert” and ”Stop” on right side correspond with the key F1, F2,F3 & F4 respectively.

Undo: press F1 to execute reset function, and return all counts to zero.

Save/Print: press F2 to execute Save/Print function,and save/print current result.

Error insert: press F3 to execute error insertion function as in Figure 3-2. Select to insert a single error, or press error rate to insert error for 1e-3, 1e-4, 1e-5, 1e-6 and 1e-7.

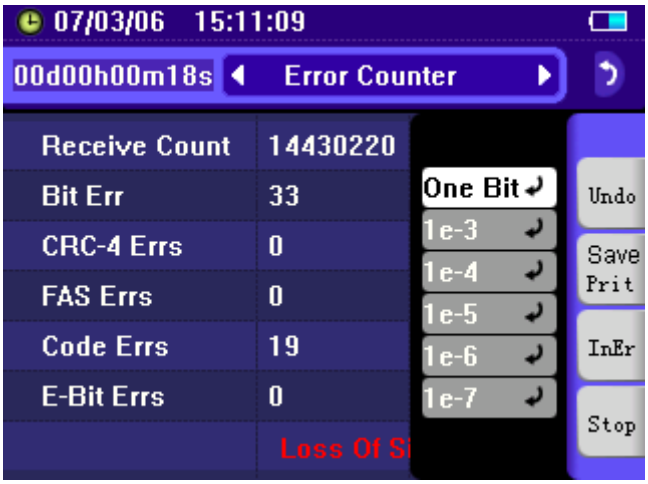


Figure 3-2 Error Insertion Setup

Pause: press F4 to execute the pause function to suspend the test as in Figure 3-3.

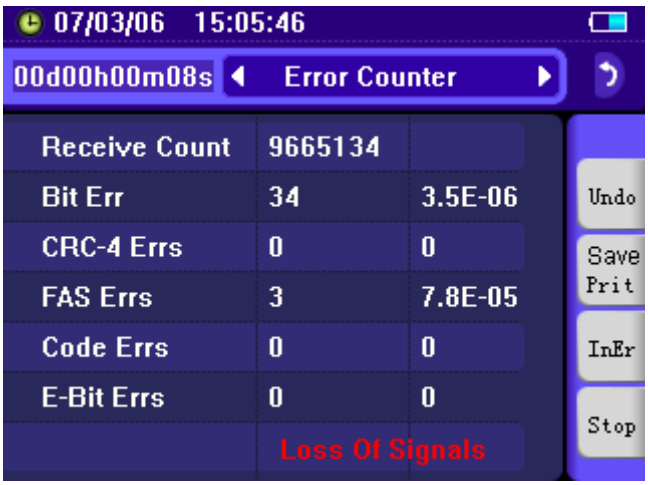


Figure 3-3 Test Pause Interface

Pay attention to the additional ”Save print” function on the right side, which corresponds with the key F2. The function of the key F4 changes to ”Continue test“. Press F4 to continue the test and change the status of the interface as in Figure 3-1.

Save print: in pause status of the test, press F2 key to see an interface as in Figure 3-4.

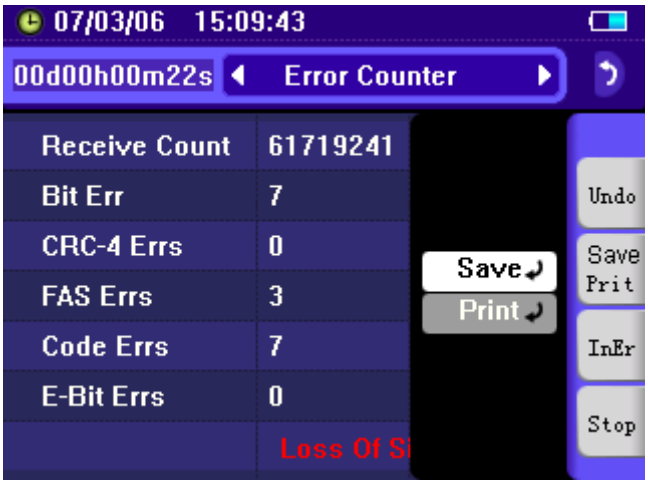


Figure 3-4 Save Print Interface

Select ”Save” to see an interface as in Figure 3-5. Press the ⇦, ⇨, ⇧ & ⇩ keys to move the cursor, and press ⊙ key to select relevant letter and digit as file name. ” Enter ” ESC and ”Backspace” commands on the right side correspond with the key F1, F2 & F3 respectively. Stored test result document can be called for viewing via “Result document” in ”Document management”.

Select ”Print” to execute the print operation and print the test result by a printer connected to the instrument. For detailed print setup, please refer to the print setup in Chapter 7 Miscellaneous Setup.

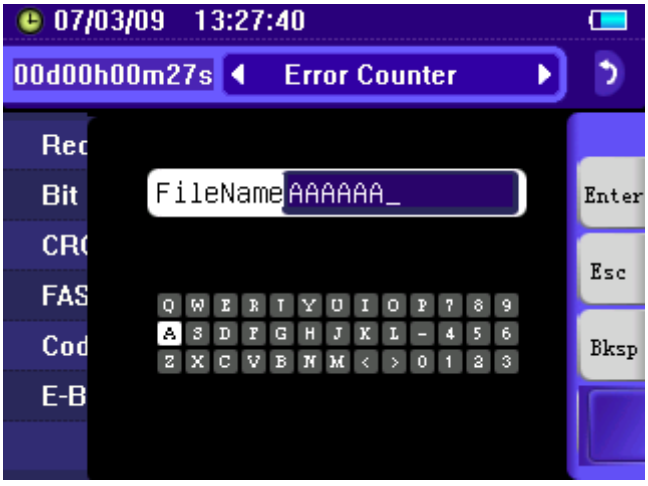
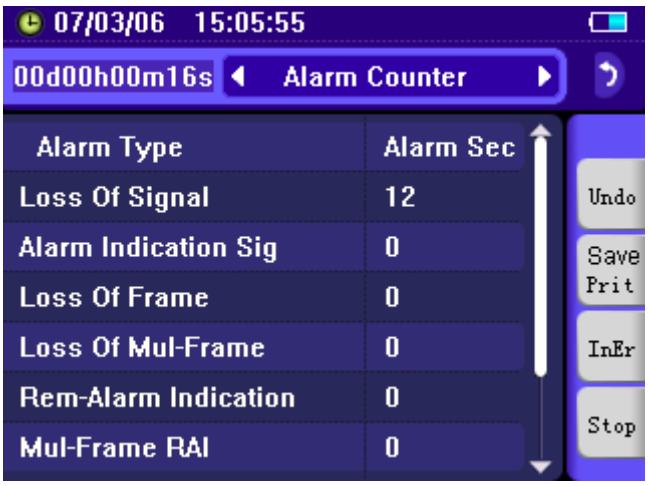


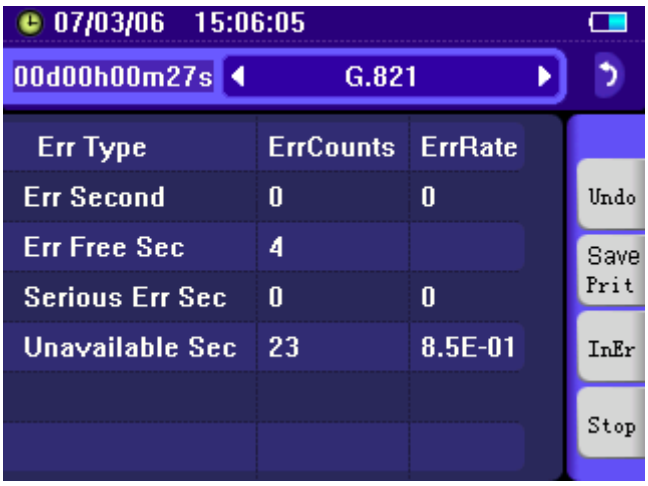
Figure 3-5 Test Result Saving Interface

Press the ⇦ and ⇨ keys to view a display menu of other analysis results.

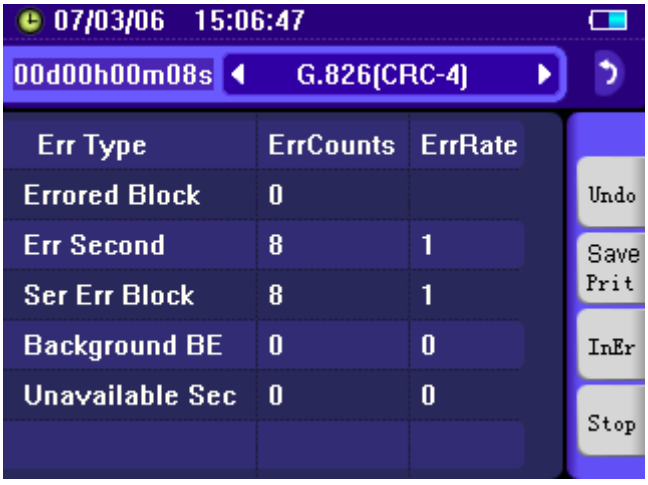
The following are examples:



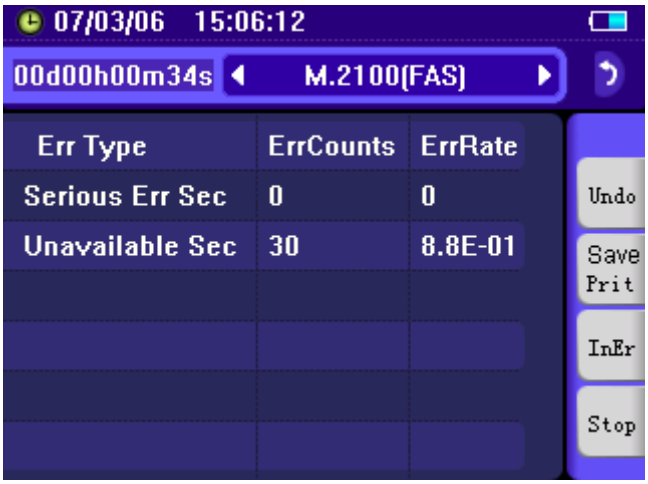
Alarm Counting Interface



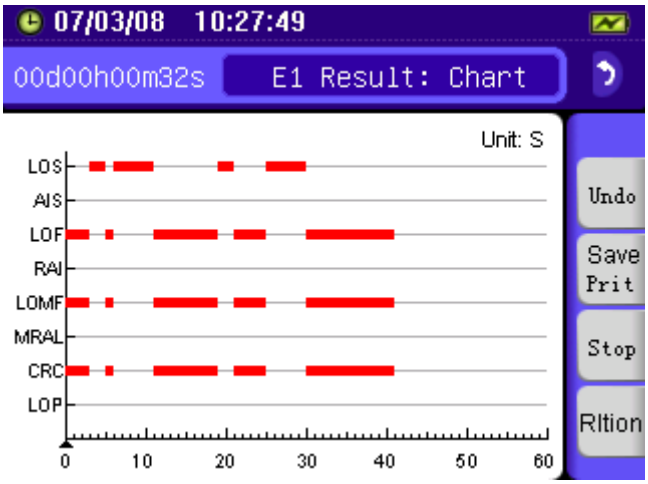
G.821 Analysis Interface



G.826 Analysis Interface



M.2100 Analysis Interface



Alarm Diagram Interface

The abbreviations on left side in above figure are explained as follows:

LOS: Loss of Signal

AIS: Alarm Indication Signal

LOF: Loss of Frame Alignment

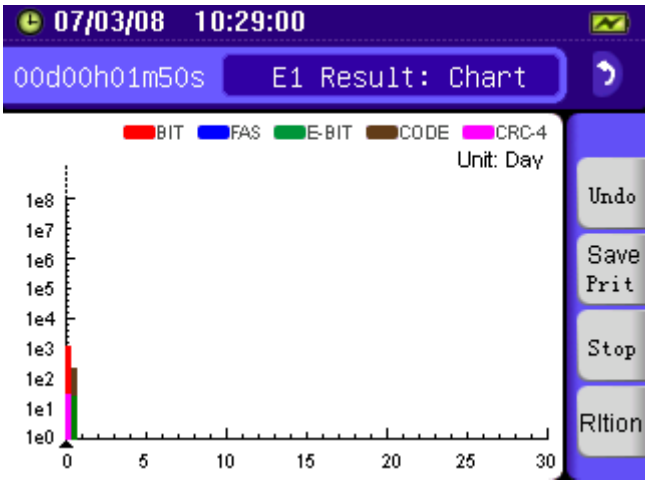
RAI: Remote Alarm Indication

LOMF: Loss of CAS multi-frame alignment

MRAI: Multi-frame Remote Alarm Indication

CRC: Loss of CRC-4 multi-frame alignment

LOP: Loss of Pattern synchronization



Error Histogram Interface

The abbreviations in upper part in above figure are explained as follows:
BIT: bit error
FAS: frame alignment signal (0011011) error
E-BIT: remote CRC-4 error, with a display of E bit
CODE: HDB3 code alternate polarity error
CRC-4: CRC-4 error

Pay attention to the definition change of function keys on right side in the interfaces of alarm indicating diagram & error histogram. “Pause” corresponds with F3 key; and F4 key is ”Resolution”. “Resolution” is used for selecting a unit for horizontal coordinate of the diagram on right side, which can be set up as second, minute, hour and day as in Figure 3-6.

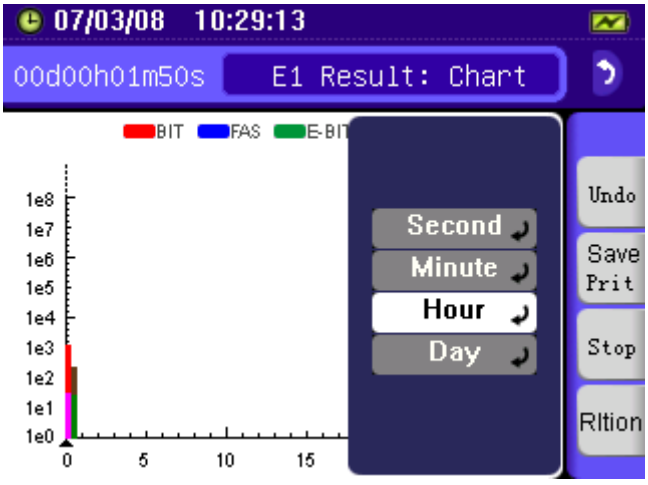


Figure 3-6 Resolution Selection

Chapter 4 Data Test and Result Analysis

4.1 High-speed Data Test

HCT-BERT/C can execute the error test function via data port. The speed of test can be set up as a multiple of 64K, with the highest speed 2304Kbit/s. The interfaces available are RS-530, RS-449, X.21, V.35 and RS-232. To execute an error test on data port, press ⇦ & ⇨ keys of the cursor in main menu interface and select ”Data Analyzer, press ⇧ & ⇩ keys to move the cursor to ”High-Speed Data“, and press ⊙ key to enter the function as in Figure 4-1.

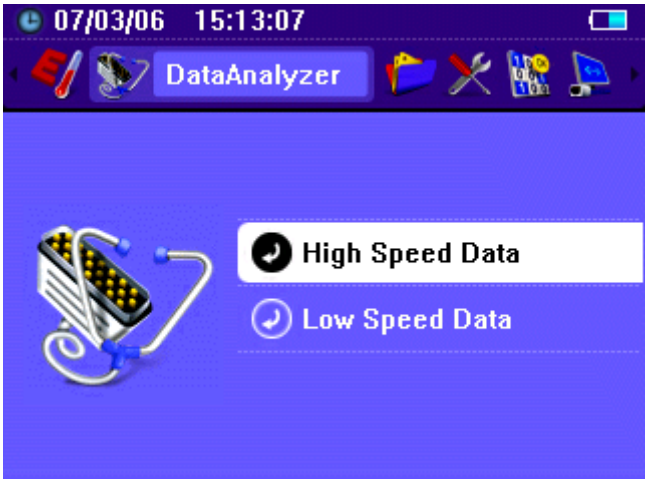


Figure 4-1 Data Test Selection Interface

The error rate function of data port can analyze the line quality of data transmission line, and displays execution results with error counting or ITU-G.821 format.

4.1.1 High-speed Data Test Setup

Enter high-speed data setup to see a configuration interface as in Figure 4-2:

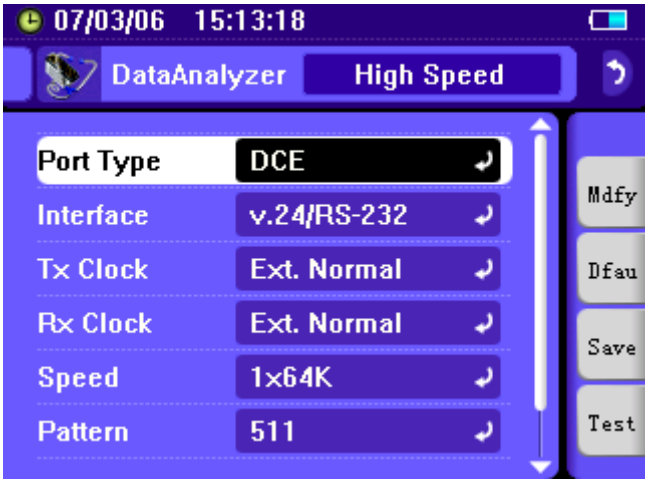
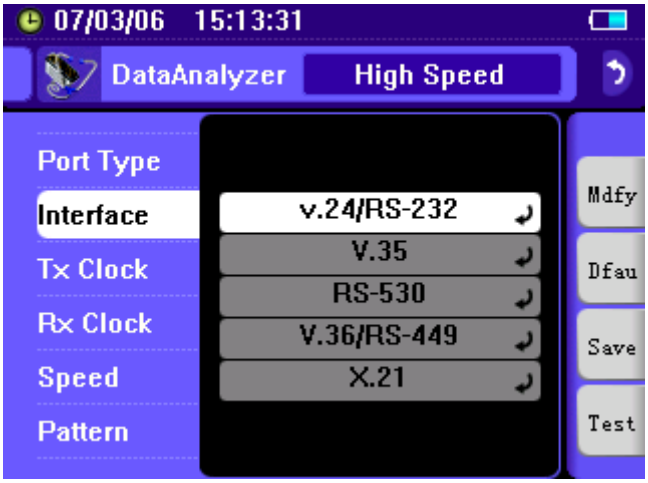


Figure 4-2 High-speed Data Configuration Menu

The parameter setup is related to the test of HCT-BERT/C data port. The user can press ⇧ or ⇩ key to move the cursor and press ◯ **key** to select relevant option. Popup dialog box will list out the values of the parameter for selection as in Figure 4-3. In the interface of Figure 4-3, press ⇧ & ⇩ key to move the cursor and select different parameters, and press ◯ **key** to confirm. Each parameter is explained in details as in the following list.



4-3 High-speed Data Test Parameter Selection Interface

The list as follows includes the parameters set up for data port error test and their meanings:

Setup	Option	Description
Data port	DCE	HCT-BERT/C data port is set up as DCE
	DTE	HCT-BERT/C data port is set up as DTE
Interface type	V.24/RS-232	HCT-BERT/C data port is set up as RS-232mode (cable)
	V.35	HCT-BERT/C data port is set up as V.35 mode (cable)
	RS-530	HCT-BERT/C data port is set up as RS-530mode (cable)
	V.36/RS-449	HCT-BERT/C data port is set up as RS-449mode (cable)
	X.21	HCT-BERT/C data port is set up as X.21mode (cable)
Transmit clock	External clock normal	The source for transmitting clock is set up as external clock
	Internal clock normal	The source for transmitting clock is set up as internal clock
	External clock inverse	The source for transmitting clock is set up as external clock, with inverse polarity
	Internal clock inverse	The source for transmitting clock is set up as internal clock, with inverse polarity
Receive clock	External clock normal	The source for receiving clock is set up as external clock
	Internal clock normal	The source for receiving clock is set up as internal clock
	External clock inverse	The source for receiving clock is set up as external clock, with inverse polarity
	Internal clock inverse	The source for receiving clock is set up as internal clock, with inverse polarity

	Phase-lock clock	Pick up clock from data-receiving flow of data port
Speed	N*64K	Speed available including: N=1 ~ 36
Test pattern	511	Pseudo-random sequence pattern: 2E9-1 (O.153)
	2047	Pseudo-random sequence pattern: 2E11-1(O.152 & O.153)
	2E15-1	Pseudo-random sequence pattern: 2E15-1 (O.151)
	2E20-1	Pseudo-random sequence pattern: 2E20-1 (O.153)
	QRSS	Pseudo-random sequence pattern: 2E20-1 (O.151 QRSS)
	2E23-1	Pseudo-random sequence pattern: 2E23-1 (O.151)
	All 1	Repetitive pattern: all 1 (11111...)
	All 0	Repetitive pattern: all 0 (00000...)
	Alternate	Repetitive pattern: alternate 1 & 0 (10101010...)
	1100	Repetitive pattern: 1100
	3 in 24	Repetitive pattern: 3 ”1” in 24 bits
	1 in 16	Repetitive pattern: 1 ”1” in 16 bits
	1 in 8	Repetitive pattern: 1 ”1” in 8 bits
	1 in 4	Repetitive pattern: 1 ”1” in 4 bits
	Fox	FOX message
	User pattern 1	User programmable pattern 1 with pattern length of 1-32 bit. For detailed setup, please refer to 5.4 User Programmable Test Pattern.
	User pattern 2	User programmable pattern 2 with pattern length of 1-32 bit. For detailed setup, please refer to 5.4 User Programmable Test Pattern.
	User pattern 3	User programmable pattern 3 with pattern length of 1-32 bit. For detailed setup, please refer to 5.4 User Programmable Test Pattern.
Test time	Consecutive	Execute error test all the time
	15 minutes	Execute error test for 15 minutes
	30 minutes	Execute error test for 30 minutes
	1 hour	Execute error test for one hour
	24 hours	Execute error test for one day

In setup interface of Figure 4-2, the key F1, F2, F3 & F4 on right side correspond with the function keys “Mdfy, ”Default setup“, “Save “ and ”Test“.

The use and connotation of function keys are the same as the setup interface in E1 test. Please refer to the descriptions in Chapter 2.

4.1.2 High-speed Data Error Test Analysis

When **HCT-BERT/C** interface displays as in Figure 4-2, press F4 to execute a test function. After test function starts, the interface displays as in Figure 4-4:

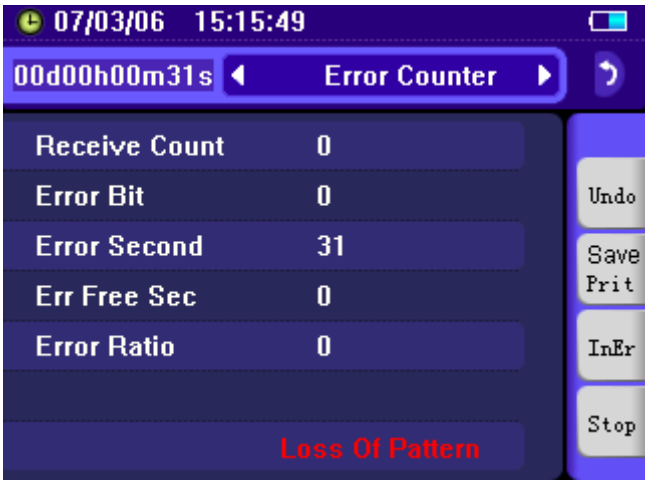


Figure 4-4 Error Counting Interface

There is a display of execution time on left upper corner of the interface after the test starts. **d**h**m**s means **day**hour**minute**second that the test has spent.

Error counter or G.821 analysis display on the right upper corner and indicate the current display mode of the menu.

The function key “Undo, “Save/Print”, “Error insert” and ” Stop on right side correspond with the key F1,F2, F3 & F4 respectively.

The setup and meaning of the function keys on right side of the interface are the same as E1 test. For detailed use methods, please refer to Chapter 3.

Press ⇦ & ⇨ keys to view the display menu of other analysis results. Figure 4-5 is G.821 analysis interface.

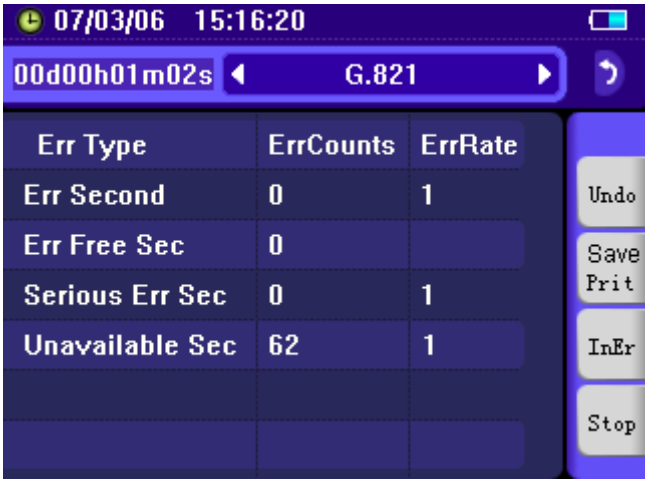


Figure 4-5 G.821 Analysis Interface

4.2 Low-speed Data Test

HCT-BERT/C can execute a low-speed error test function on data port. In case of asynchronous status, the speed of test can be set up as 50bps-115.2kbps, and in case of synchronous status, it can be set up as automatic detection and 150bps-56kbps. In synchronous status, interface is set up as RS-530, RS-449, X.21, V.35 and RS-232. To execute a low-speed error test on data port, press ⇦ & ⇨ keys of the cursor in main menu interface to select ”Data test “, press ⇧ & ⇩ keys to move the cursor to ”Low-speed data“, and press ㋡ **key** to enter the function, as in Figure 4-1.

The error rate function of data port can analyze the line quality of data transmission line, and displays execution results with error counting format.

4.2.1 Low-speed Data Test Setup

Enter low-speed data setup to see a configuration interface as in Figure 4-6:

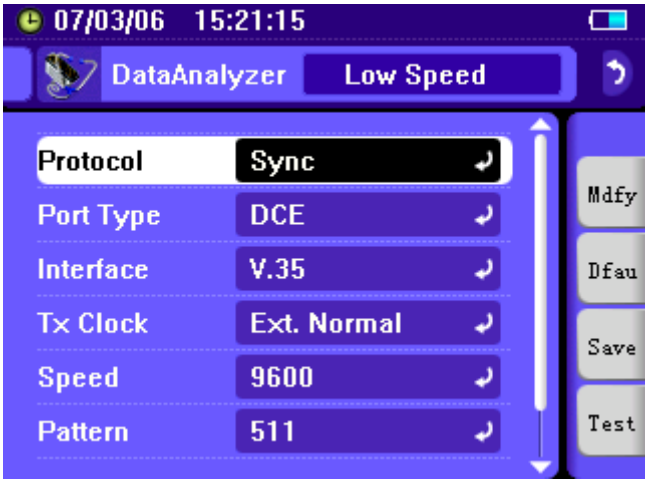
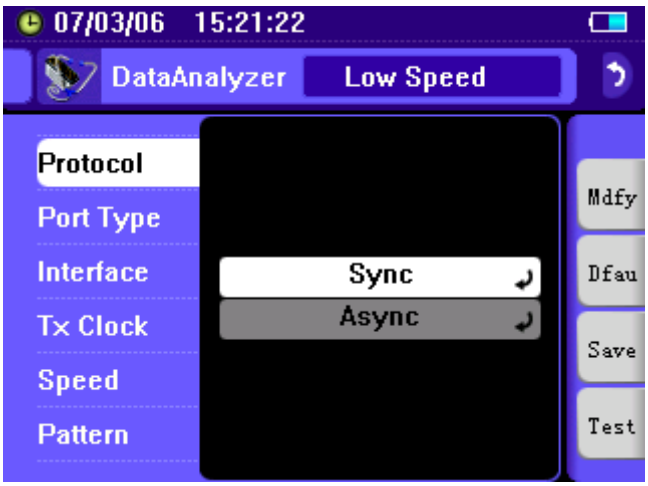


Figure 4-6 Low-speed Data Test Setup Interface

”Synchronous” or ”Asynchronous” can be selected for low-speed data test protocol. Different protocols contain different parameters for setup. The setup of these parameters is related to the test of HCT-BERT/C data port. The user can press ⇧ or ⇩ key to move the cursor, press ㋡ **key** to select relevant options. Popup dialog box will list out the parameters available for selection as in Figure 4-7. In the interface of Figure 4-7, press ⇧& ⇩ keys to move the cursor to select different parameters, and press ㋡ **key** to confirm.

Various parameters of “Synchronous” and ”Asynchronous” during low-speed data test are explained in details as follows.



4-7 Parameter Selection Interface of Low-speed Data Test

4.2.1.1 Parameter Setup for “Synchronous” Low-speed Data Test

As in Figure 4-7, select synchronous protocol, of which various parameters and values are explained in the following list:

Setup	Option	Description
Data port	DCE	HCT-BERT/C data port is set up as DCE
	DTE	HCT-BERT/C data port is set up as DTE
Interface type	V.24/RS-232	HCT-BERT/C data port is set up as RS-232 mode (cable)
	V.35	HCT-BERT/C data port is set up as V.35 mode (cable)
	RS-530	HCT-BERT/C data port is set up as RS-530 mode (cable)
	V.36/RS-449	HCT-BERT/C data port is set up as RS-449 mode (cable)
	X.21	HCT-BERT/C data port is set up as X.21 mode (cable)
Transmit clock	External clock normal	The source for transmitting clock is set up as external clock
	Internal clock normal	The source for transmitting clock is set up as internal clock
	External clock inverse	The source for transmitting clock is set up as external clock, with inverse polarity
	Internal clock inverse	The source for transmitting clock is set up as internal clock, with inverse polarity
Speed	50bps ~ 115.2kbps	Speeds available including: 150, 200, 300, 600, 1200, 2400, 4800, 7200, 9600, 12k, 14.4k, 19.2k, 28.8k, 33.6k, 38.4k, 48k, 56kbps.
Test pattern	511	Pseudo-random sequence pattern: 2E9-1 (O.153)
	2047	Pseudo-random sequence pattern: 2E11-1 (O.152 & O.153)
	2E15-1	Pseudo-random sequence pattern: 2E15-1 (O.151)
	2E20-1	Pseudo-random sequence pattern: 2E20-1 (O.153)
	QRSS	Pseudo-random sequence pattern: 2E20-1 (O.151 QRSS)
	2E23-1	Pseudo-random sequence pattern: 2E23-1 (O.151)
	All 1	Repetitive pattern: all 1 (11111...)

	All 0	Repetitive pattern: all 0 (00000...)
	Alternate	Repetitive pattern: alternate 1 and 0 (10101010...)
	1100	Repetitive pattern: all 1100
	3 in 24	Repetitive pattern: 3 ”1” in 24 bits
	1 in 16	Repetitive pattern: 1 ”1” in 16 bits
	1 in 8	Repetitive pattern: 1 ”1” in 8 bits
	1 in 4	Repetitive pattern: 1 ”1” in 4 bits
	FOX	FOX message
	User pattern 1	User programmable pattern 1 with pattern length of 1-32 bit. For detailed setup, please refer to 5.4 User Programmable Test Pattern.
	User pattern 2	User programmable pattern 2 with pattern length of 1-32 bit. For detailed setup, please refer to 5.4 User Programmable Test Pattern.
	User pattern 3	User programmable pattern 3 with pattern length of 1-32 bit. For detailed setup, please refer to 5.4 User Programmable Test Pattern.
Test time	Consecutive	Execute error test all the time
	15 minutes	Execute error test for 15 minutes
	30 minutes	Execute error test for 30 minutes
	1 hour	Execute error test for one hour
	24 hours	Execute error test for one day

4.2.1.2 Parameter Setup for “Asynchronous” Low-speed Data Test

As in Figure 4-7, select asynchronous protocol, of which various parameters and values are explained in the following list:

Setup	Option	Description
Data port	DCE	HCT-BERT/C data port is set up as DCE
	DTE	HCT-BERT/C data port is set up as DTE
Test pattern	511	Pseudo-random sequence pattern: 2E9-1 (O.153)
	2047	Pseudo-random sequence pattern: 2E11-1(O.152 & O.153)
	All 1	Repetitive pattern: all 1 (11111...)
	All 0	Repetitive pattern: all 0 (00000...)
	Alternate	Repetitive pattern: alternate 1 and 0 (10101010...)
	FOX	FOX message
Speed	50bps ~ 115.2kbps	Speeds available including: 50, 75, 300, 600, 1200, 2400, 4800, 7200, 9600, 12k, 14.4k, 19.2k, 28.8k, 38.4k, 57.6k, 115.2kbps.
Data bit	8	8-bit word-size mode
	7	7-bit word-size mode
Parity Check	None	Select no odd or even check
	Odd check	Select odd check
	Even check	Select even check
Stop bit	1	Select the length of stop bit as 1 bit
	2	Select the length of stop bit as 2 bits
Flow control	None	Select no flow control
	RTS/CTS	Select hardware flow control
	XON/XOFF	Select software flow control
Test time	Consecutive	Execute error test all the time

	15 minutes	Execute error test 15 minutes
	30 minutes	Execute error test 30 minutes
	1 hour	Execute error test for one hour
	24 hours	Execute error test for one day

In setup interface of Figure 4-6, the function keys “Mdfy, ”Default “, ”Save “ and “Test“ on right side correspond with the key F1, F2, F3 & F4 respectively. The use and meaning of the function keys are the same as the setup interface in E1 test. Please refer to the descriptions in Chapter 2.

4.2.2 Analysis of Low-speed Data Error Test

When **HCT-BERT/C** screen displays setup interface as in Figure 4-6, press F4 to execute the test function.

After test function starts, the screen displays as in Figure 4-8:

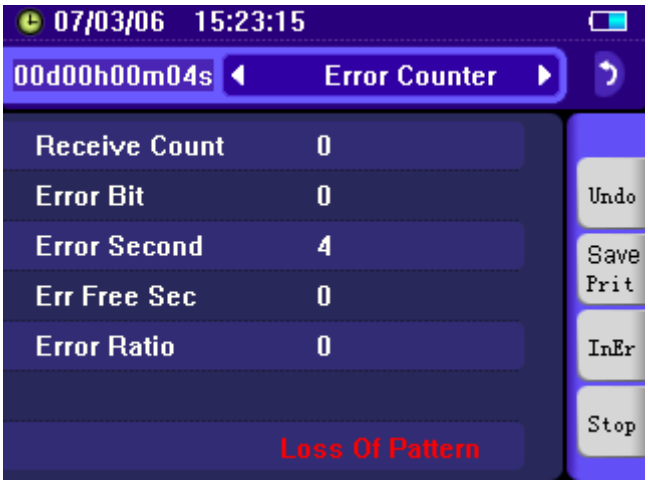


Figure 4-8 Analysis Interface for Low-speed Data Error Test

There is a display of execution time on left upper corner of the interface after the test starts. **d**h**m**s means **day**hour**minute**second that the test has spent.

Error counting displays on the right upper corner and indicates the current display mode of the menu. The function key “Undo, “Save/Print”, “Error insert” and ” Stop on right side correspond with the key F1,F2, F3 & F4 respectively.

The setup and meaning of the function keys on right side of the interface are the same as E1 test. For detailed use methods, please refer to Chapter 2.

Chapter 5 Document Management

5.1 Introduction

When **HCT-BERT/C(E1)** stays in the main menu, press ⇦ & ⇨ keys of the cursor to select ” File. The interface displays as in Figure 5-1 and includes ”Configuration File and ”Result File.

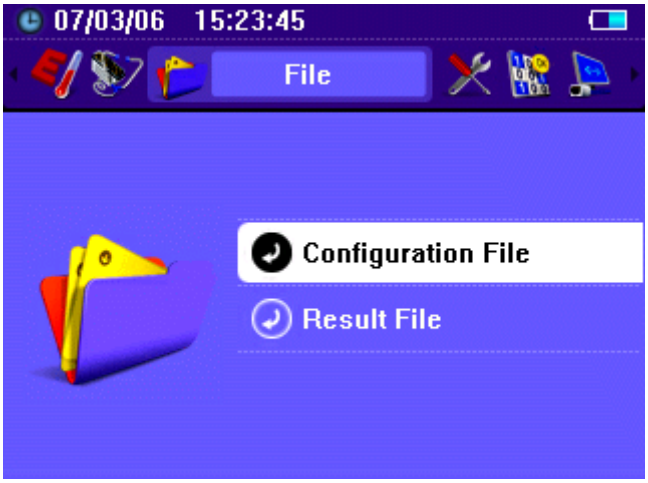


Figure 5-1 Document Management Interface

5.2 Configuration File

Use ⇧ & ⇩ keys to move the cursor to ”Configuration File, and press ◯ key to select the function. The instrument displays as in Figure 5-2.

The documents where setup is saved up can be called out, including ”E1 “, ”High-speed data“, “Low-speed synchronous data “ and ”Low-speed asynchronous data “ (for relevant contents, please refer to Chapter 2 E1 Test and Chapter 4 Data Test) as in Figure 5-3. Use ⇧ & ⇩ keys move the config document where the cursor stays. Press F3 to delete a configuration document; and press ◯ key to select a configuration document for calling and viewing, of which all parameters and selected values of the configuration will display on the screen.

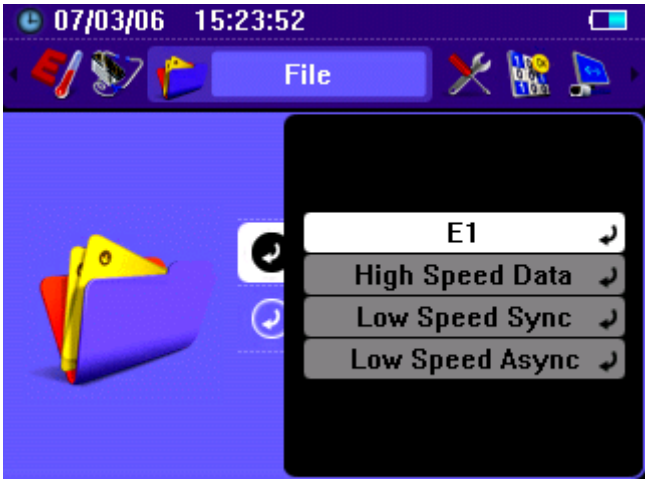


Figure 5-2 Config Document Selection Interface

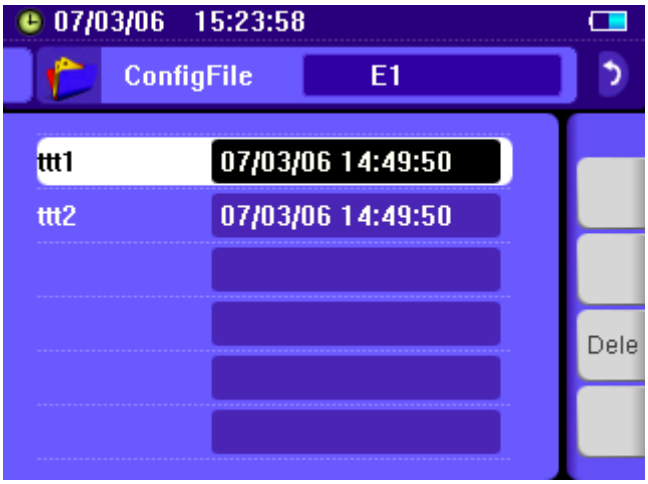


Figure 5-3 E1 Config Document Calling Interface

5.3 Result File

Use ⇧ & ⇩ keys to move the cursor to ”Result File, and press ㊥ key to select the function. The instrument displays as in Figure 5-2.

The documents where test results are saved up can be called out, including ”E1 “, ”High-speed data “, “Low-speed synchronous data “ and ”Low-speed asynchronous data “ (for relevant contents, please refer to Chapter 2 E1 Test and Chapter 4 Data Test) as in Figure 5-3. Use ⇧ & ⇩ keys move the result document where the cursor stays. Press F3 to delete a result document; and press ㊥ key to select a result document for calling and viewing, of which all results of the test will display on the screen.

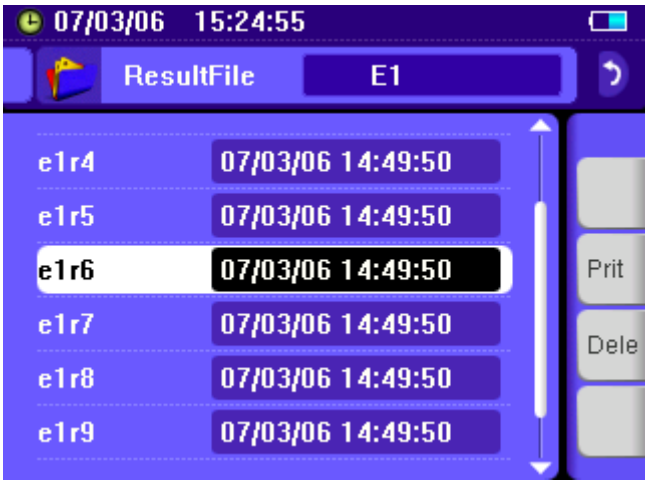


Figure 5-4 E1 Test Result Document Calling Interface

Chapter 6 Advanced Options

6.1 Introduction

When **HCT-BERT/C(E1)** stays in the main menu, press ⇦ & ⇨ keys of the cursor to select ”Advanced”. The interface displays as in Figure 6-1. “Advanced” comprise several parts including ”E1 frequency “, ”Pattern Editor, ” Round Trip delay”, ” Signal Bit test“ and ” Signal Bit Editor, which are described as follows.

Figure 6-1 Advanced Options Interface

6.2 E1 Frequency Test

In setup interface of “Advanced options” as in Figure 7-1, use ⇧ & ⇩ keys to move the cursor to ”E1 frequency Offset test“, press ◯ key to select the function and start E1 frequency deviation test. The instrument displays as in Figure 6-2.

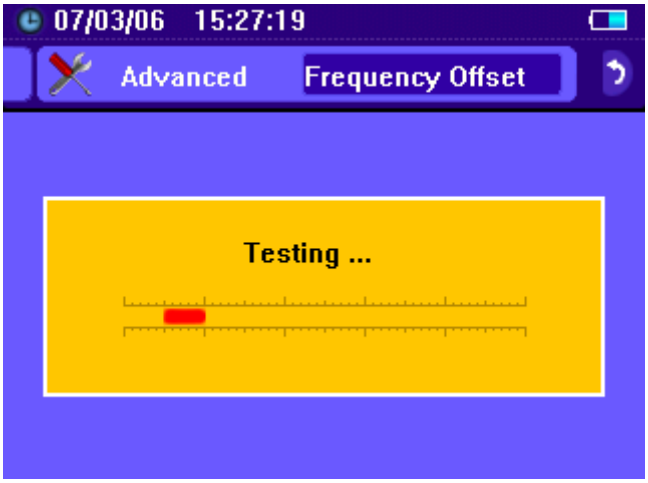


Figure 6-2 E1 Frequency Offset Test Interface

After the test finished, the results display as in Figure 6-3.

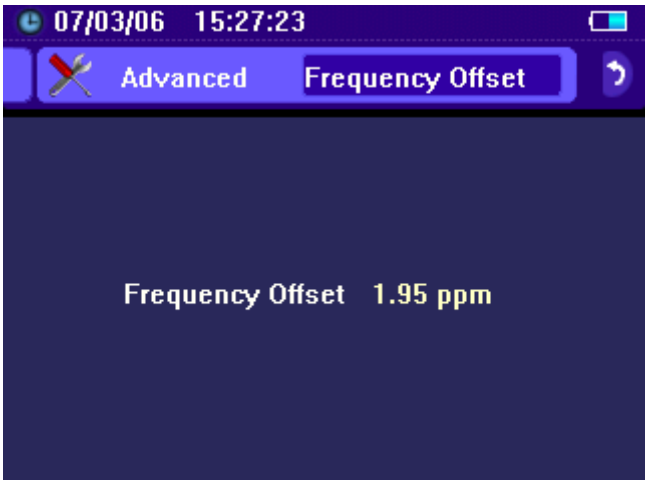


Figure 6-3 E1 Frequency Offset Test Result

6.3 Pattern Editor

The pattern editing function is described in Chapter 2 in details. Please refer to 2.1.4 User Programmable Test Pattern for details.

6.4 *Round Trip* Delay

In setup interface of “Advanced options” of Figure 7-1, use ⇧ & ⇩ keys to move the cursor to ” Round Trip delay”, and press ◯ key to select the function. The instrument displays as in Figure 6-4. “Round Trip delay” test includes two parts i.e. ”E1 channel” delay test and ”N*64K channel ” delay test.

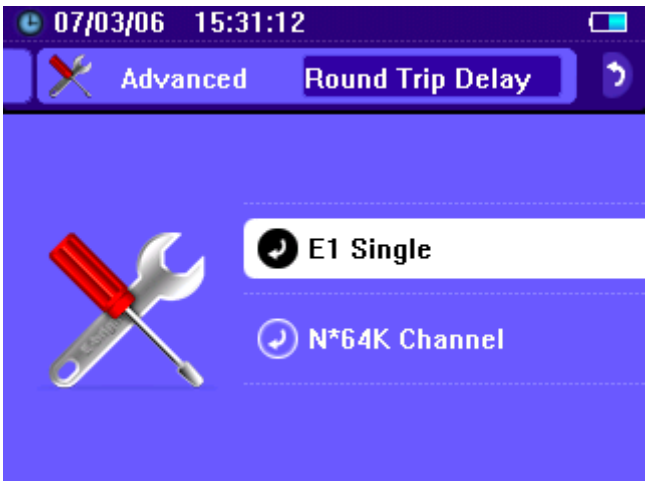


Figure 6-4 Round Trip Delay Selection Interface

6.4.1 E1 Channel Round Trip Delay Test

Use ⇧ & ⇩ keys to move the cursor to ”E1 channel”, and press ◌ **key** to select the function and start E1 channel Round Trip delay test. The instrument displays as in Figure 6-5.

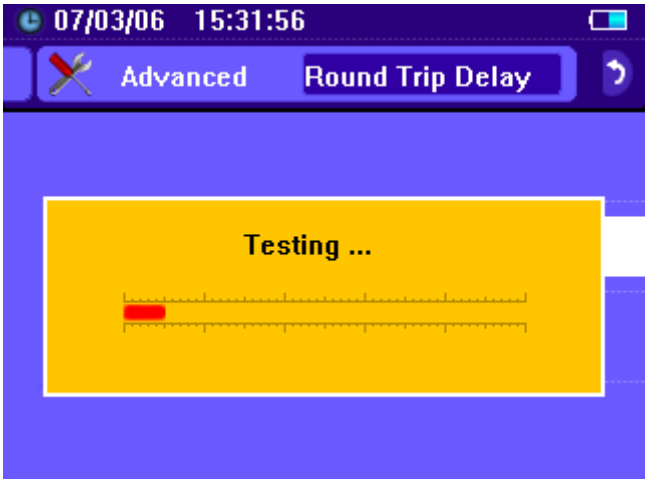


Figure 6-5 Round Trip Delay Test Interface

After the test finished, the results display as in Figure 6-6.

Figure 6-6 E1 Channel Round Trip Delay Test Result

6.4.2 N*64K Channel Round Trip Delay Test

Use ⇧ & ⇩ keys to move the cursor to ”N*64K channel”, press ◌ key to select the function and start N*64K channel Round Trip delay test. The instrument displays as in Figure 6-5.

6.5 Signal Bit Test

In setup interface of “Advanced options” of Figure 6-1, use ⇧& ⇩ keys to move the cursor to ” Signal Bit test“, and press ◯ key to select the function. The instrument displays as in Figure 6-7. “Signal Bit test“ comprises four parts including ”Si-bit test“, “Sa bit test“, “MFAS test“ and ” CAS test“.

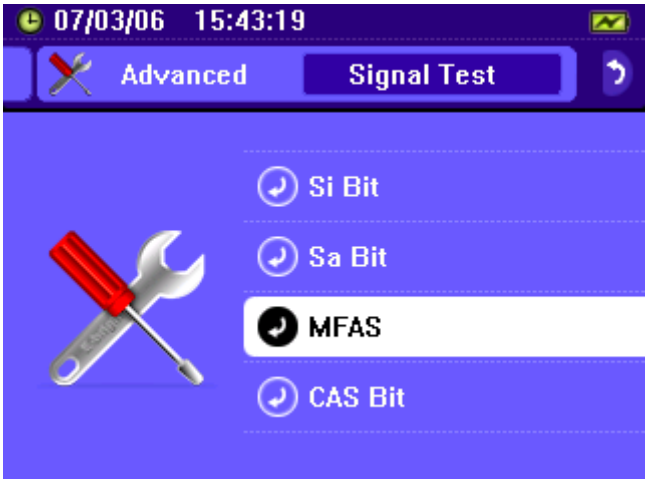


Figure 6-7 Signal Bit Test Selection Interface

6.5.1 Si-Bit Test

Use ⇧ & ⇩ keys to move the cursor to ”Si-bit test “, press ◯ key to select the function and start Si-bit test. Test result is as in Figure 6-8

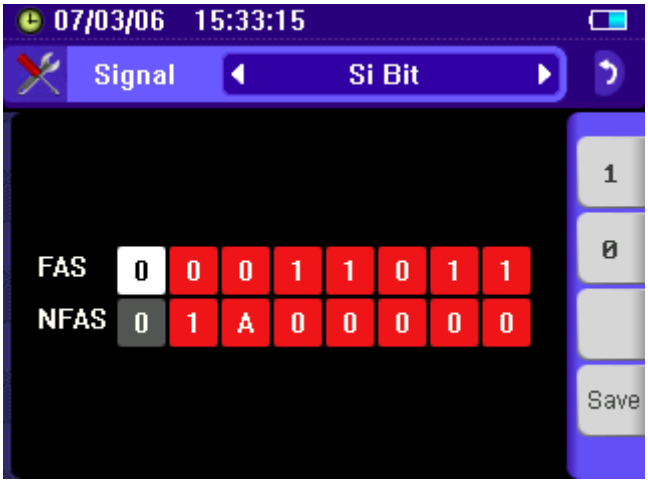


Figure 6-8 Si-bit Test Result

6.5.2 Sa-bit Test

Use ⇧ & ⇩ keys to move the cursor to ”Sa-bit test“, press ◯ key to select the function and start Sa-bit test. The instrument displays as in Figure 6-9.

Sa4-Sa8 bits are the spare bits of E1 and can be applied in unit-to-unit application recommended in ITU-T. The address of Sa4-Sa8 bits is in E1 frame of odd number and inside time slot 0. In one E1 multi-frame, eight E1 frames have Sa bit. Sa bit received will display on the screen in real time as in Figure 6-9.

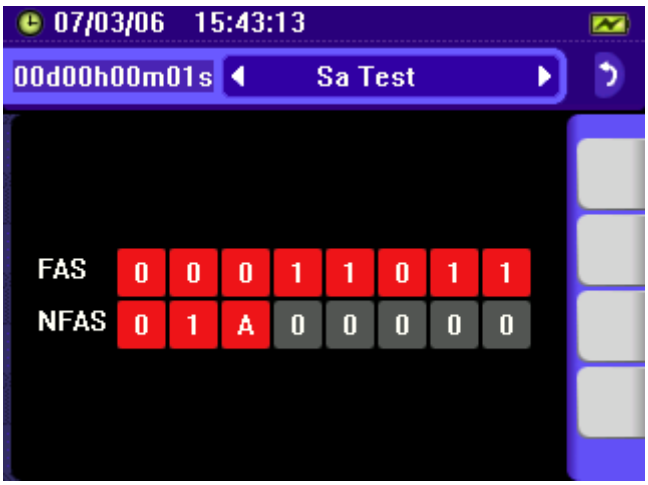


Figure 6-9 Sa-bit Test Result

6.5.3 MFAS Test

Use ⇧ & ⇩ keys to move the cursor to “Fastest “, press ◯ **key** to select the function and start MFAS test. The instrument displays as in Figure 6-10.

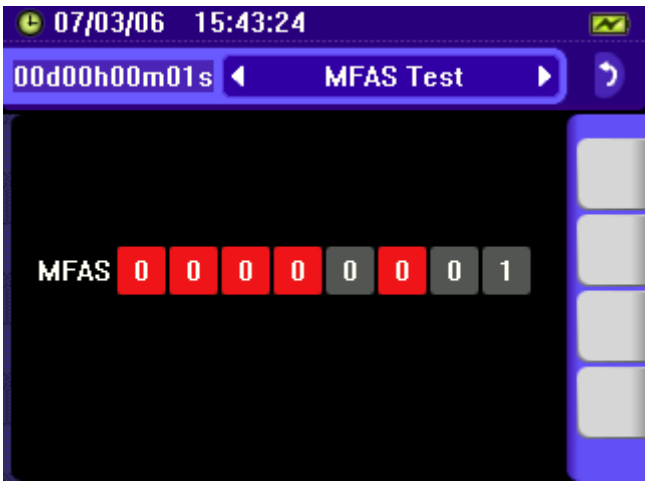


Figure 6-10 MFAS Test Result

6.5.4 CAS Test

Use ⇧ & ⇩ keys to move the cursor to ”Signaling test“, press ◯ key to select the function and start CAS test. The instrument displays as in Figure 6-11.

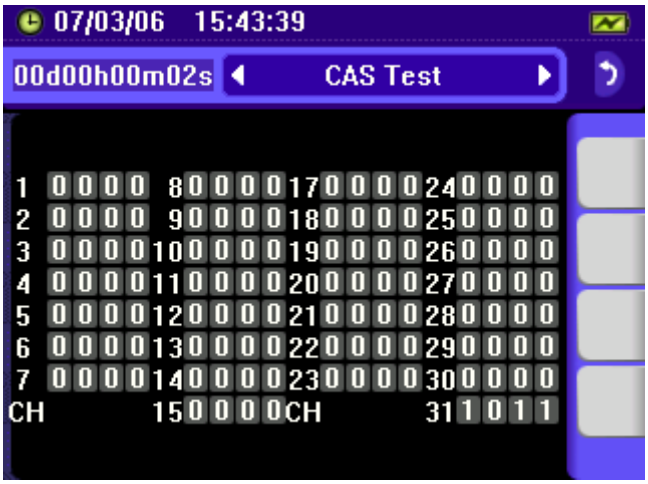


Figure 6-11 CAS Test Result

The menu displays receiving port, each time slot and A, B, C & D signaling bits. (Actual position of A, B, C & D of E1 is time slot 16 of E1 CAS framing mode). When **HCT-BERT/C(E1)** is not in CAS mode, the option will be unavailable.

6.6 Signal Bit Editor

In setup interface of “Advanced options” of Figure 6-1, use ⇧ & ⇩ keys to move the cursor to “Signal Bit Editor, press ◯ key to select the function. The instrument displays as in Figure 6-12. “Signal Bit Editor comprises four parts i.e. ”Si-bit setup“, ”Sa-bit setup“, ”MFAS setup“ and “CAS setup“.

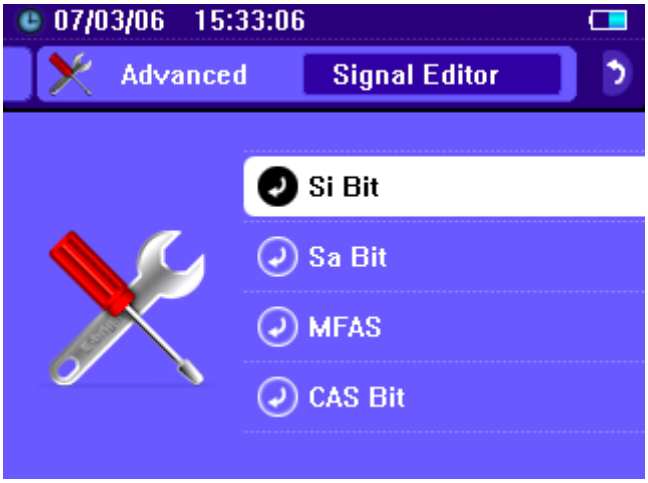


Figure 6-12 Signal Bit Editor Selection Interface

6.6.1 Si-bit Setup

Use ⇧ & ⇩ keys to move the cursor to ”Si-bit setup“, press ◯ **key** to select the function. The instrument displays as in Figure 6-13.

The function keys “1”, “0” & “Save setup” on right side correspond with the key F1, F2 & F4 respectively. Various function keys are explained as follows:

[F1] 1 Set up the bit as ”1”.

[F2] 0 Set up the bit as ”0”.

[F4] Save setup Save up current setup.

Each small check that represents one bit displays current status with color.

Red: the bit cannot be set up.

Black: the bit can be set up.

White: the current position of cursor.

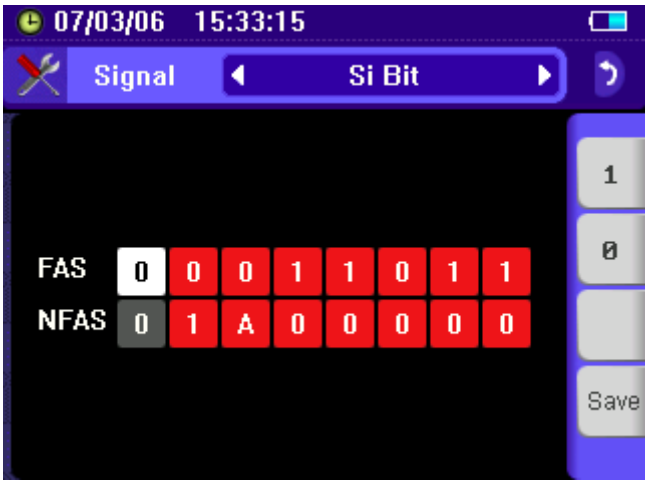


Figure 6-13 Si-bit Setup Interface

6.6.2 Sa-bit Setup

Use ⇧ & ⇩ keys to move the cursor to ”Sa-bit setup“, press ◯ **key** to select the function. The instrument displays as in Figure 6-14. White check indicates current position of cursor.

The function keys “1”, “0” & “Save setup” on right side correspond with the key F1, F2 & F4 respectively. Various function keys are explained as follows:

[F1] 1 Set up the bit as ”1”.

[F2] 0 Set up the bit as ”0”.

[F4] Save setup Save up current setup.

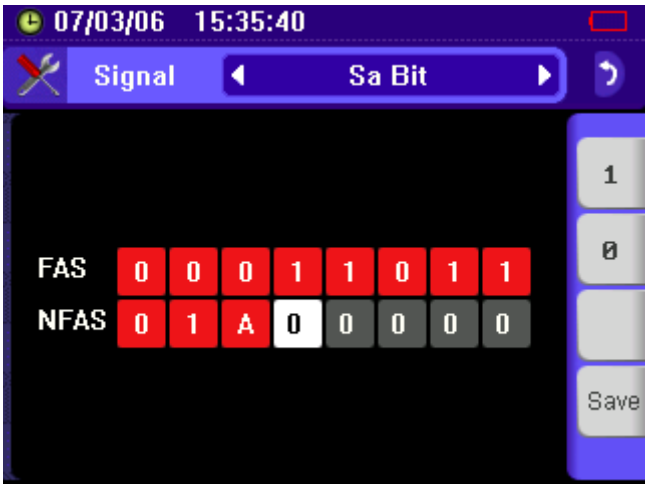


Figure 6-14 Sa-bit Setup Interface

6.6.3 MFAS Setup

Use ⇧ & ⇩ keys to move the cursor to ”MFAS setup“, press ◯ **key** to select the function. The instrument displays as in Figure 6-15.

The function keys “1”, “0” & “Save setup” on right side correspond with the key F1, F2 & F4 respectively. Various function keys are explained as follows:

[F1] 1 Set up the bit as ”1”.

[F2] 0 Set up the bit as ”0”.

[F4] Save setup Save up current setup.

Each small check that represents one bit displays current status with color.

Red: the bit cannot be set up.

Black: the bit can be set up.

White: the current position of cursor.

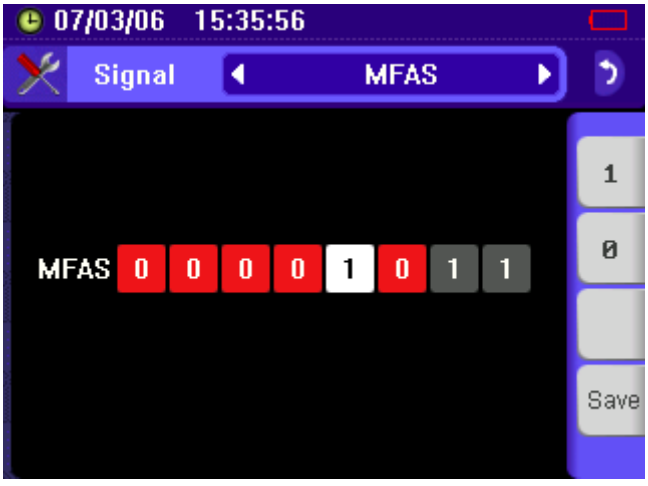


Figure 6-15 MFAS Setup Interface

6.6.4 CAS Setup

Use ⇧ & ⇩ keys to move the cursor to " CAS setup", press ◯ key to select the function. The instrument displays as in Figure 6-16. When **HCT-BERT/C (E1)**is set up as in E1 CAS framing mode, "Signaling setup" function is available. If **HCT-BERT/C(E1)** isn't in CAS mode, it will be unavailable.

The function keys "1", "0" & "Save setup" on right side correspond with the key F1, F2 & F4 respectively. Various function keys are explained as follows:

[F1] 1 Set up the bit as "1".
[F2] 0 Set up the bit as "0".
[F4] Save setup Save up current setup.

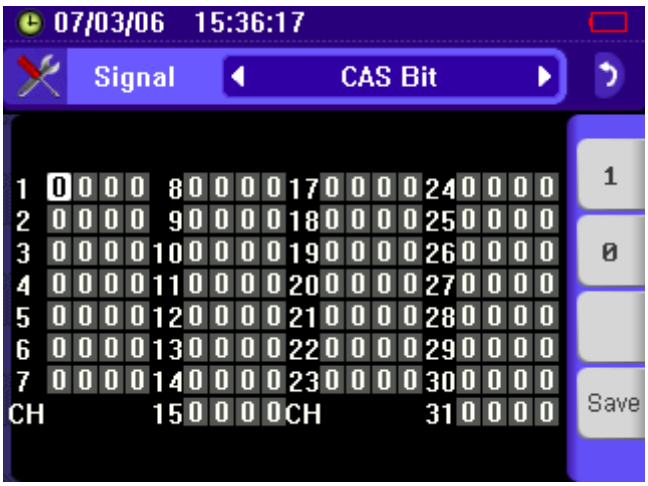


Figure 6-16 CAS Setup Interface

Chapter 7 Device

7.1 Introduction

When **HCT-BERT/C(E1)** stays in the main menu, press ⇦ & ⇨ keys of the cursor to select ” Device. The interface displays as in Figure 7-1. “Instrument setup“ includes ”version information”, ” Factory Default, “Language Select, ” Sound setup” & “Miscellaneous setup“, which are described as follows.

Figure 7-1 Device Setup Interface

7.2 Version Information

In the interface of “ Device of Figure 7-1, use ⇧ & ⇩ keys to move the cursor to ”Version information”, press ◯ key to select the function. The instrument displays hardware and software versions as in Figure 7-2.

Figure 7-2 Version Information Interface

7.3 Factory Default

From the “Device" menu, Figure 7-1, use ⇧ & ⇩ keys to move the cursor to “Factory Default", press ◯ key to select the function. The instrument displays as in Figure 7-3. The user can use ⇧ & ⇩ keys to select ”Yes”, and press ◯ key to confirm the operation and restore various parameters of the device to the default setup when it is issued from the factory; and select ”No” to cancel the operation and return the interface to Figure 7-1.

Figure 7-3 Default Setup Confirming Interface

7.4 Language Select

In the interface of “Device of Figure 7-1, use ⇧ & ⇩ keys to move the cursor to ”Language Select, press ◯ key to select the function. The instrument displays as in Figure 7-4.

Display interface in Chinese or English is available. Use ⇧ & ⇩ keys to move the cursor to the language type to be selected, and press ◯ key to confirm.

Figure 7-4 Language Select Interface

7.5 Sound Setup

From the “Device" menu, Figure 7-1, use ⇧ & ⇩ keys to move the cursor to ” Sound setup”, press ◯ key to select the function. The instrument displays as in Figure 7-5.

Sound setup includes ”Key Sound setup” and ”Alarm Sound setup”. Use ⇧ & ⇩ keys to move the cursor to the option to be set up, and press ◯ key to select the function. The instrument displays as in Figure 7-6. Use ⇧& ⇩ keys to open or close Sound function, and press ◯ key to conform.

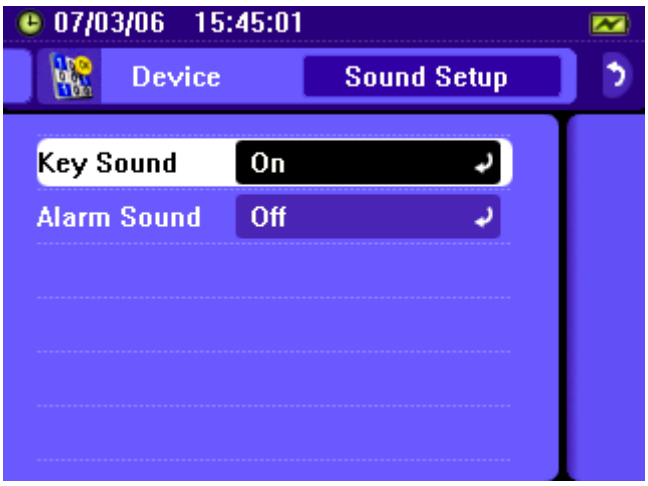


Figure 7-5 Sound Setup Interface

Figure 7-6 Sound Setup Selection Interface

7.6 Miscellaneous Setup

From the “Device" menu, Figure 7-1, use ⇧ & ⇩ keys to move the cursor to ”Miscellaneous “, press ⏲ key to select the function. The instrument displays as in Figure 7-7.

“Miscellaneous setup“ includes ”Printing mode setup”, “Interval timing“ and “Date setup”, “Time setup” and ”Screen backlight”, which are described as follows.

Figure 7-7 Miscellaneous Setup Interface

7.6.1 Print Mode Setup

In ”Miscellaneous setup“ interface as in Figure 7-7, use ⇧ & ⇩ keys to move the cursor to “Print mode setup”, and press ⏲ key to select the function. The instrument displays as in Figure 7-8.

Three print modes are available:

Handle: i.e. manual print function. In test interface, press the function key “Save print” on right side of the instrument, and select print to start print function (for detailed operation, please refer to Chapter 3 E1 Test and Chapter 4 Data Test);

Print on Error: i.e. start to print automatically in case of an error in the test;

Interval print: i.e. print the test result at an interval of time set up by ”Print timing“ (for detailed setup, please refer to 8.6.2 Print Timing).

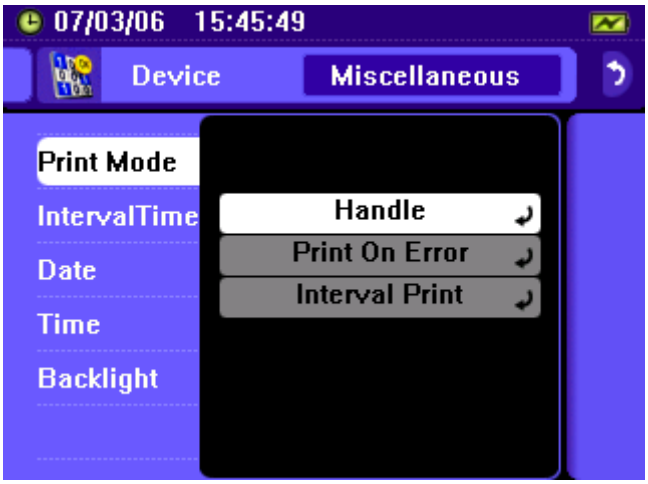


Figure 7-8 Print Mode Setup Interface

7.6.2 Interval print

In “Miscellaneous setup” interface as in Figure 7-7, use ⇧ & ⇩ keys to move the cursor to ”Print timing“, press ⊙ key to select the function. The instrument displays as in Figure 7-9.

In case of Interval print in “Print mode setup”, the instrument will print the test result at an interval of time set up by ”Print timing“. The interval of time can be 5 minutes, 15 minutes, 30 minutes or 1hour.

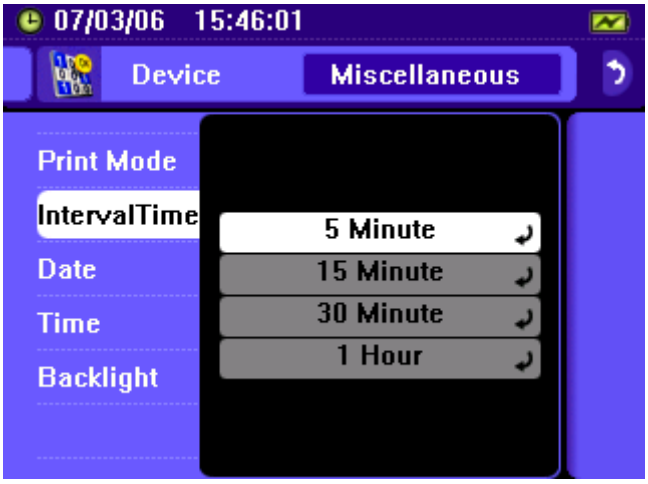


Figure 7-9 Print Timing Setup Interface

7.6.3 Date Setup

In “Miscellaneous setup” interface as in Figure 7-7, use ⇧ & ⇩ keys to move the cursor to ”Date setup”, press ◯ **key** to select the function. The instrument displays as in Figure 7-10.

Figure 7-10 Date Setup Interface

Use ⇦ & ⇨ keys to select the year, month & day for modifying. Highlight check is the area where the cursor stays. Use ⇧ & ⇩ keys to change the value of date, and press ◯ **key** to confirm.

7.6.4 Time Setup

In “Miscellaneous setup” interface as in Figure 7-7, use ⇧ & ⇩ keys to move the cursor to “Time setup”, press ◯ **key** to select the function. The instrument displays as in Figure 7-11.

Use ⇦ & ⇨ keys to select the hour, minute & second for modifying. Highlight check is the area where the cursor stays. Use ⇧ & ⇩ keys to change the value of time, and press ◯ **key** to confirm.

Figure 7-11 Time Setup Interface

7.6.5 Screen Backlight Setup

In “Miscellaneous setup” interface as in Figure 7-7, use ⇧ & ⇩ keys to move the cursor to “Screen backlight”, press ◎ **key** to select the function. The instrument displays as in Figure 7-12.

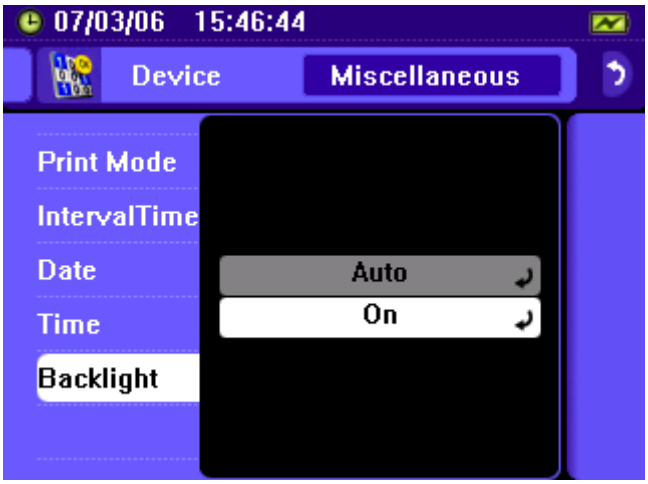


Figure 7-12 Screen Backlight Setup Interface

“Automatic” or “Normally on” is available for ”Screen backlight selection”. In case of ”Automatic”, the backlight turns off when the instrument is inactive for two minutes. The screen becomes blank automatically if it doesn’t act within five minutes consecutively. In case of ”Normally on”, the backlight of instrument will always turn on.

Chapter 8 Terminal

The instrument can update software and download file via USB interface and be output to peripheral equipments.

The instrument is connected with PC via USB cable as in Figure 8-1:

Figure 8-1 Terminal Connection

In this status, the documents of the instrument stored on PC can be accessed, including result document and config document, and can be saved to PC or be printed.

Appendices:

1. HD26 Pin Assignment

HD26 pin assignment:			
Pin 1	FGND	Pin 14	CTS(B)
Pin 2	TD(A)	Pin 15	TC(A)
Pin 3	RD(A)	Pin 16	XTC(B)
Pin 4	RTS(A)	Pin 17	RC(A)
Pin 5	CTS(A)	Pin 18	N.C.
Pin 6	DSR(A)	Pin 19	N.C.
Pin 7	GND	Pin 20	DTR(A)
Pin 8	DCD(A)	Pin 21	RD(B)
Pin 9	N.C.	Pin 22	DSR(B)
Pin 10	N.C.	Pin 23	TC(B)
Pin 11	TD(B)	Pin 24	XTC(A)
Pin 12	DTR(B)	Pin 25	RC(B)
Pin 13	RTS(B)	Pin 26	DCD(B)

2. HD26 Pin (Printer)Assignment as follows:

Pin	Signal	Notes
1	/STROBE	/STROBE pulse sent out along with data
2	DATA 1	Parallel data 1-8 bits signal. In case that the data is logic 1, it is high level. In case that the data is logic 0, it is low level.
3	DATA 2	
4	DATA 3	
5	DATA 4	
6	DATA 5	
7	DATA 6	
8	DATA 7	
9	DATA 8	
10	GND	
11	BUSY	In case high received signal, printer cannot receive data. High signal due to reasons as follows: In case of vacant data In case of printing In case of being offline In case of printer failure
12	GND	
13	GND	
14	/AUTO FEED XT	Supply to the printer via 10K resistance+5V
15	/SLCT IN	Grounding (GND).

3. E1 Balance Interface (RJ-45) Pin Assignment:

Pin 1	Receive
Pin 2	Receive
Pin 3	
Pin 4	Transmit
Pin 5	Transmit
Pin 6	
Pin 7	GND
Pin 8	GND

4. Table for HD26-DB25 (RS530) Cable:

HD26(Male)	PIN#	<->	PIN#	DB25(Male/Female)
TD(A)	2	<->	2	
TD(B)	11	<->	14	
RD(A)	3	<->	3	
RD(B)	21	<->	16	
RTS(A)	4	<->	4	
RTS(B)	13	<->	19	
CTS(A)	5	<->	5	
CTS(B)	14	<->	13	
DSR(A)	6	<->	6	
DSR(B)	22	<->	22	
DTR(A)	20	<->	20	
DTR(B)	12	<->	23	
DCD(A)	8	<->	8	
DCD(B)	26	<->	10	
TC(A)	15	<->	15	
TC(B)	23	<->	12	
RC(A)	17	<->	17	
RC(B)	25	<->	9	
XTC(A)	24	<->	24	
XTC(B)	16	<->	11	
XRC(A)	9	<->	21	
XRC(B)	18	<->	18	
GND	7	<->	7	
FGND	1	<->	1	

Note: (A)(B) signal line of the same signal must use strand cable pairs.

5. Table for HD26-MB34 (V.35) Cable:

HD26 (Male)	PIN#	<->	PIN#	MB34 (Male/Female)
TD(A)	2	<->	P	
TD(B)	11	<->	S	
RD(A)	3	<->	R	
RD(B)	21	<->	T	
RTS(A)	4	<->	C	
CTS(A)	5	<->	D	
DSR(A)	6	<->	E	
DTR(A)	20	<->	H	
DCD(A)	8	<->	F	
TC(A)	15	<->	Y	
TC(B)	23	<->	AA	
RC(A)	17	<->	V	
RC(B)	25	<->	X	
XTC(A)	24	<->	U	
XTC(B)	16	<->	W	
XRC(A)	9	<->	Z	
XRC(B)	18	<->	BB	
GND	7	<->	B	
FGND	1	<->	A	

Note: (A)(B) signal line of the same signal must use strand cable pairs.

6. Table for HD26-DB15 (X.21) Cable

HD26 (Male)	PIN#	<->	PIN#	DB15 (Male/Female)
TD(A)	2	<->	2	T(A)
TD(B)	11	<->	9	T(B)
RD(A)	3	<->	4	R(A)
RD(B)	21	<->	11	R(B)
RTS(A)	4	<->	3	C(A)
RTS(B)	13	<->	10	C(B)
DCD(A)	8	<->	5	I(A)
DCD(B)	26	<->	12	I(B)
RC(A)	17	<->	6	S(A)
TC(A)	15	<->	6	
RC(B)	25	<->	13	S(B)
TC(B)	23	<->	13	
GND	7	<->	8	Ground
FGND	1	<->	1	Shield

Note: (A)(B) signal line of the same signal must use strand cable pairs.

7. Table for HD26-DB25 (RS232) Cable

HD26 (Male)	PIN#	<->	PIN#	DB25 (Male/Female)
TD	2	<->	2	
RD	3	<->	3	
RTS	4	<->	4	
CTS	5	<->	5	
DSR	6	<->	6	
DTR	20	<->	20	
DCD	8	<->	8	
TC	15	<->	15	
RC	17	<->	17	
XTC	24	<->	24	
XRC	9	<->	21	
GND	7	<->	7	
FGND	1	<->	1	

8. HCT-BERT/C Inventory:

Ref	Item	Product name	Qty
1	Main machine	2M meter (including 7.5V Li-battery)	1
		Instrument handle tape	1
2	Standard parts	Data port cable DB26/V35M/V35F (1M)	1
3		Data port cable DB26/DB25M/DB25F (1M)	1
4		USB interface cable (straight-through cable)	1
5		BNC cable (1M)	2
6		Print cable HD26/C36M-Printer	1
7		HD26/RJ45(Ethernet Changer)	1
8		220V-9V/2A power adapter	1
9		Operating manual	1
10		Pack	1
11		External packing carton	1
12	Optional parts	Data port cable DB26/DB37M/DB37F (1M)	1
13		Data port cable DB26/DB15M/DB15F (1M)	1

9. HCT-BERT/E1 Inventory:

Ref	Item	Product name	Qty
1	Main machine	2M meter (including 7.5V Li-battery)	1
		Instrument handle tape	1
2	Standard parts	USB interface cable (straight-through cable)	1
3		BNC cable (1M)	2
4		Print cable HD26/C36M-Printer	1
5		220V-9V/2A power adapter	1
6		Operating manual	1
7		Pack	1
8		External packing carton	1

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